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## Occupation Analysis

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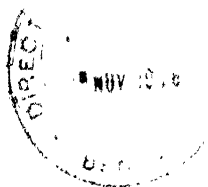
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American Technical Society

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# **Success Through Vocational Guidance**

## **Occupation Analysis**

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### **Introduction**

#### **1. Not easy to choose**

The choice of a life work is the most important choice we ever make; yet for many there seems to be no choice. They appear to be born into a job, or driven by necessity to take what comes, or tossed from place to place until they settle in some occupation they never desired. Yet a study of such a life would show many places where choice was blocked only by ignorance and indifference. A more satisfactory choice is nearly always possible to the person who will endure but a fraction of the discomfort suffered during a lifetime in a hated occupation.

It is not easy to choose wisely. No one can know for what he is fitted without such an analysis of abilities, opportunities, and desires as few persons can make unaided. A lifetime of unassisted experience would not give the necessary knowledge of jobs, and at the end the time of choice would have passed. When personal analysis has shown just what educational, physical, mental, financial, and other capital is available, and an occupational analysis has charted the field from which choice can be made, it is still sometimes hard to find the best roads leading from present to desired positions.



## **2. What will you invest in a job?**

When you know what you **can** do, what you **want** to do, and **how** to do it, the choice narrows down to the question: Would I **rather** do it than serve a life sentence to hard labor in a hated job? You must answer this for yourself.

We cannot always do the thing we wish. A legless man cannot become a long-distance runner. Some positions require greater effort than they are worth. Leaving these out, everyone has enough choice before him to tax all his powers and to bring him much improvement.

Every person has a certain amount of physical, mental, and perhaps financial capital to invest in his life's work. Before you can make an intelligent choice you must take an inventory of yourself and know just what capital you have. This is the meaning of the self-analysis which you are asked to make.

When you know what capital you have, you will want to know the opportunities for investment. What occupations are open? We cannot examine every occupation in detail. To describe each of the nearly ten thousand "gainful occupations" listed in the United States census would result in a meaningless confusion. Thousands of these jobs are of no interest to the average person. A majority are minute specializations of main occupations, of interest only after a first choice has been made.

A practical study must be able to help real people solve the practical problem of choosing a life work. It should point out the next step along a road to a desired and desirable goal. Some jobs do not lead anywhere. They are "dead ends" or "blind alleys" from which the only escape is over the fence into a different road. Such jobs should be marked with a sign "No Thoroughfare."

### 3. Job transportation stations

A vocational, like a railroad, guide should describe roads between jobs and the entertainment provided at stopping places. It should emphasize the jobs into which and through which there is good transportation. Every position should be a station on the road of life, not a terminus. Other things being equal, a job is desirable according to the number of roads leading from it to better jobs.

Some classes of jobs are not of general interest. Most of the marine industries—the occupations of sailor, fisherman, lighthousekeeper, coast guard, etc.—are seldom given practical consideration save by those who live near a large body of water. Most of those who enter the occupations of farming and mining do so because their fathers worked at them, they are close at hand, or a share in ownership is inherited. Such occupations require less notice in vocational guidance than those where choice is more frequent.

**Choice** is the thing with which we are most concerned. Therefore those fields should be emphasized where choice, for the most people, is most frequent, important, and difficult.

Choice is not a concern of youth alone. There is no final choice until life ends. Most of us make many vocational choices. Every such decision will be more satisfactory if based on greater knowledge.

### 4. Masters of our fate

It is not true that we are always masters of our fate. There are moments when circumstances sweep us from our moorings. The Great War changed the fate of almost half the population of the globe. It ended choice forever

for millions. Because it forced new choices upon millions, nearly every national government involved undertook some sort of special vocational training and guidance for adults. Everyone recognized that intelligent, advised, directed choice saves waste of life and national resources. With the aid of such guidance any part of any life can be better directed than when guided only by the comparatively blind ignorance of any individual.

The long generations of pioneers struggling westward could seldom take a direct route. They turned aside for marshes, mountains, rivers, and other obstacles. But they kept on toward the West and built new civilizations. The mariner does not sail on regardless of shoals, reefs, storms, currents, and harbor lines. He allows for all these in plotting his course, meets unforeseen difficulties as they arise, submits to unavoidable delays, turns aside when a higher duty calls, but usually arrives at his destination. The explorer looks upon each new height scaled, each new advance as a point from which to determine a new route. So every job held should be made a vantage point from which to plot a course to a better vocation.

### **5. Planning better than drifting**

One thing is beyond dispute—planned progress is always better than drifting. The more care and knowledge used in picking a route, the greater the prospect of a safe and speedy journey to a desired end.

Any sort of a goal in education is far better than the aimless browsing and indifferent acceptance of whatever is suggested that characterize the average educational career. Lack of such a goal rivals incompetent teaching as a cause of lack of interest in school work. There is always vital interest in education related to a definite goal.

## **6. Choice not confined to youth**

It is good that most lives have more than one goal. It is often dangerous to fix too firmly the career of youth. It is fortunate that youth does not take its prospective burdens and obligations too seriously. Yet those burdens and obligations which come with manhood are considerations that must not be neglected in choosing a vocation. Indeed it is not until they are considered that some of the most important elements of choice are present. Not until the man is thinking of a family and a home and begins to compare himself, his opportunities, income, work, and place in the world with those about him, is he capable of making a choice upon which he will stake his life and the lives of those dependent upon him.

He has usually begun to play his part in the world of industry long before this. He has often learned a trade or worked at several occupations. He has health, strength, enthusiasm, and some income beyond his actual physical needs. He can still change without sacrificing the welfare of others and without seriously interfering with his own happiness. Here is a second period of critical choice. It is at least as important for a majority as the period of leaving the grade or high school. There will be many other times of choice throughout any active growing life.

The world of industry changes and we change with it. Such changes may transform the wisest childhood decision into manhood's despair. An occupation, once attractive, may become unbearably distasteful. New inventions often make old occupations unprofitable. Any one of a host of circumstances may absolutely bar the road to progress within some chosen trade. Often health conditions make change imperative. New ambitions may demand new objectives.

## Typical Lines of Promotion

Types	Extractive		Transportation	Manufacturing	Mercantile
Unskilled Manual	Agriculture	Mining	Section Men Bridge and Construction Crews Crossing Guards	Truckers, Loaders Excavators Sweepers	Truckers, Watchmen
	Hired Men Casual Laborers	Helpers			
Semi-Skilled Clerical		Timekeeper Tallymen	Station Agents, Ticket Sellers, Clerks	Bill and File Clerks Bookkeepers Office Boys Machine Tenders Inspectors	Clerks, Cashiers Messengers Stenographers Checker Wrapper
Skilled Craftsmen	Farmer Dairy Worker Stock Raiser Gardener	Miner Shot Fitter	Engineers, Firemen Telegraphers, Motormen Conductors, Machinists Brakemen	Machinists, Toolmakers Carpenters and other Building Trades Stockkeepers, Draftsmen	Salesmen Packers Bookkeepers Head of Stock
Professional Managerial	Beyond this Point Special can be learned		Effort and Study Effort and Study Effort and Study	are required in ce on the job.	addition to what
	Farm Manager Agricultural Expert	Mine Superintendent Geologist Mining Engineer	Civil Engineer Electric Engineer Superintendents and other Higher Executives Managers Automotive Engineer Telephone Engineer Personnel Director	Mechanical Engineer Management Engineer Employment Manager Accountant Architect Contractor and Builder Structural Engineer Superintendents Safety Engineer Training Director	Buyer, Superintendent Advertising Manager Personnel Director Certified Public Accountant Bank Cashier, Manager and other Higher Executives Sales Manager Firm Accountant

**Note:** This chart shows typical jobs. They are not arranged in any promotional order within the types. The details will vary in different industries and even in different firms, but the same general types will nearly always be present. The point is indicated where training apart from the job is a necessity for promotion.

The causes that justify change in occupation are infinite in number. They are a part of the universal law of change. Any system of vocational guidance that seeks to plant a human being like a tree or a monument in a position where it must remain for life or forever, that makes no provision for change, is blind to the biggest need and the most frequent opportunity for its services. There is no final choice of work while life remains. There is no choice but that more knowledge might have made it wiser, easier, and more satisfactory.

### 7. Types of jobs

It is worth while to classify jobs for choice in two ways: one, according to the product and fields of work, that is, such divisions as Agriculture, Mining, Transportation, Building, Manufacture, Trading, Professions, etc.; the other, according to the sort of work done, that is, how much education and skill is required, the qualifications for entrance and success, and the opportunities they afford. Both of these methods of classification should be studied by anyone choosing an occupation. We will take the second method of classification first. Any careful study of the people who work will show certain **types** of jobs in nearly every industry. It will help to understand the two methods of classification if we think of these types as running horizontally across a vertical arrangement of the fields of industry, as shown in the chart on page 6.

Nearly every industry employs a large number of "unskilled manual workers." These are so numerous as to make up the largest single division of workers. Such are the "hired men" on the farms, the section men, construction gangs, crossing guards and freight handlers in trans-

portation, the truckers, loaders, excavators, sweepers, mortar mixers, machine tenders, and similar workers in the manufacturing and commercial industries. These men can be interchanged without difficulty. Their work requires so little preparation that it can be quickly taught to any ordinary person. Usually little beyond crude strength is needed. They receive the lowest wages, work the longest hours, have the fewest privileges, die youngest, suffer most from sickness and accident, are always first to be discharged when business slackens and last employed when prosperity comes. No one would intentionally choose such work. Most of those in this class have left hope behind and never expect to reach a better position.

Very few have completed even a common school education or have received any special training. This is one of the most important reasons why they are in this undesirable class.

### **8. Taking first job offered**

Investigations have shown that this class of unskilled labor at the bottom of the industrial ladder is recruited quite largely from boys who, having no advice when choosing an occupation, took the first job that came to hand, regardless of whether it led anywhere or not, and who did not use their leisure time to prepare for a better choice.

Just a trifle higher in the scale is the type of common clerical workers, who often work even longer hours for lower wages than the purely manual laborers. Such are most timekeepers, tallymen, ticket sellers, bill and file clerks, cashiers in restaurants and stores, and the long list of "white collared pencil pushers" who have been through the first few grades at school and then gravitated into their

present positions. There are such positions in every industry, and those holding them can be shifted about with little change as to salary, hours, conditions of work, or prospects of future advancement. The only use of such jobs is as stepping stones. The important question for those occupying them is not so much how they spend their time when at work as how they spend their leisure. If this is used only for amusement, the amusement will grow less with years. If a part of it is used for definite training for a specific and better position, then leisure and pleasure in coming years will far exceed that sacrificed in the present.

It is a fact that much of the world's necessary work consists of just such jobs. They must be done. They are a part of the "chores" which, if left undone, would make difficult or impossible the doing of other more interesting, difficult, and valuable work.

Someone must do these chores. It is no waste of life to do a portion of them. But they should not be made the life work of anyone capable of better things. They can be made stopping places—temporary means of support—to gain the training for more desirable positions.

The lesson taught by Frederick W. Taylor that there is really no such thing as an unskilled job is not being overlooked. It is true that piling bricks, carrying pig iron, watching an automatic machine, or any other work can be made highly skilled, intensely interesting, and a pathway to promotion by time and motion study, analysis of all job possibilities, and properly adjusted training. At the bottom it is never the job that is unskilled, but always the worker.

But we are dealing with things as they are in the working world of today. In that world there are, as industry



## Earning Capacity and Education

Of 100 Students who enter the Grade Schools of the United States—      Of 100 Workers engaged in the American Industries the Wages earned average as follows—

4 leave before 4th Grade	4 earn about \$150 per year
9 leave in 4th Grade	5 earn about 200 per year
13 leave in 5th Grade	6 earn about 250 per year
14 leave in 6th Grade	6 earn about 300 per year
14 leave in 7th Grade	8 earn about 350 per year
13 leave in 8th Grade	8 earn about 400 per year
67 leave up to 8th Grade	7 earn about 450 per year
33 complete 8th Grade	11 earn about 500 per year
23 leave after 8th Grade	13 earn about 600 per year
10 attend High School	68 earn less than \$15 per week
3 graduate from High School	32 earn over \$12 per week
5 out of 1000 attend College	15 earn about \$ 750 per year
4 out of 1000 attend 2 years	12 earn about 1000 per year
3½ out of 1000 attend 3 years	3 earn about 1250 per year
3 out of 1000 graduate from College	2 earn over 1250 per year

The average worker will attain no higher degree of training than the state has the wisdom to offer and the authority to require.

*From Bureau of Education Bulletin.*

and individual workers are learning to their sorrow, millions of unskilled persons still doing work in an unskilled and wasteful way and receiving little pleasure or money for their labor. Until the skill is put into the worker, these jobs will continue to be destructive to employers' profits and individuals' hopes.

### **9. Skilled crafts**

The next step is a step up into the more common skilled trades, such as machinists, carpenters, compositors, firemen, engineers, telegraphers, etc. Here wages are higher and conditions of labor better, but they are usually dependent upon the ability of union organizations to secure and maintain them by constant fighting. Work is still apt to be irregular and determined by seasonal or business conditions.

In most cases training for the trade is obtained by experience on the job and such informal instructions as foremen or older employees are ready to give. In many trades remnants of the old apprenticeship system are found. A boy contracts for a certain number of years at low wages with an agreement that he will be taught the trade. Modern industry does not find such agreements satisfactory to either party. The boy seldom receives the education he needs, and employers dislike being bound by apprenticeship agreements.

Apprenticeship is being replaced and supplemented by special training in schools. Many public schools now have manual or trade courses where the rudiments of many trades are taught. Any boy considering these occupations should make use of such opportunities while still in school. One or two additional years spent in such schooling brings rich returns in later life.

These basic staple trades include the great majority of the working population. They are followed in every locality. Those who work at them do a large share of the useful work of the world. They represent a step in advance above the unskilled manual, or half-skilled clerical, but, for the really ambitious person, their greatest value is their possibilities as stepping stones to better things.

#### **10. Where leisure measures progress**

We now come to a class of occupations of a wholly different type. It is built upon and above all these others and can seldom or never be entered without special effort **outside of regular working hours**. Even within the trades the person preferred in hiring, who has steady work when others are laid off, who is picked for the best jobs, is the one who makes best use of his **leisure** time. From now on progress is measured as much or more by what is learned off as on the job. Here is the point where it is necessary to add the experience of others to that of the individual.

Entrance into this stage represents a second point of choice, often more important than the one made in youth, and in a majority of cases the only real choice made by the great mass of workers. Many boys take the first job offered, or choose with little consideration of the possibilities, opportunities, and handicaps of the occupation they enter. By the time they reach manhood they find themselves in an undesirable occupation, or more frequently, in one of the two stages of some occupation just described. They have learned much by experience. They are much better fitted to choose a life work than when they entered their present work, and they are at the stage where

they can choose whether they will stay in their present position until old age sends them into the discard, after a lifetime of monotonous, distasteful, poorly paid, and irregular work, or whether they will choose and make the necessary effort to gain a position giving pleasanter and more desirable and remunerative work. They are in the prime of life, usually without a family, able to move about, to study, and to choose.

### 11. Time of vital choice

Advice and assistance in vocational guidance is even more valuable at this stage than in school days. It is still possible to correct a wrong choice, but there is not time to make many more mistakes in choosing. Yet few persons at this stage have all the information needed for a wise choice.

This is the point where "dead end" jobs can be used as stepping stones by those who find themselves in such positions. It is not really the job but the man which matters. If the man is a "blind alley" man with no vision and no desire to advance, then he will soon stagnate in any position. But if he uses the "blind alley" job as a training station from which to obtain a living while preparing for something better, he need not worry about a temporary occupation of such a position. Jobs, like railroad and most political platforms, should be something to go from, not to stand on.

There is another way in which jobs are like railroad platforms—opportunities to travel pass by them regularly. These opportunities continue through life, but the earlier the right road is chosen the longer the period of happy progress. In these days when grandparents are attending college and millions of adults are studying to enter new

lines of activity, no one believes that "it is impossible to teach an old dog new tricks."

## **12. Carrying schoolhouse on your back**

Some facts are common to all jobs above the line where individual and special effort is required to rise. Preparation for them calls for the use of certain intellectual or mental tools that cannot be acquired or used without considerable preliminary education. It is perfectly true that a few men have in the past, by extraordinary efforts, risen to the highest points in nearly every field of life with very little schooling. It has been said of such persons that they got an education by "carrying the schoolhouse on their backs" as they went about their work. They almost literally dug and pried and pulled the information they needed out of the world in which they lived.

Few persons possess the physical stamina and the mental determination and stubborn will to endure what is needed to accomplish such progress. Moreover the possibility of doing this without a certain amount of systematic educational preparation grows less yearly. The qualifications for higher positions are constantly rising. In many occupations these are fixed by legislation. This is true of doctors, lawyers, certified public accountants, and many other professions. In other lines professional organizations practically bar those without a certain standard preparation. Such is the case with many of the engineering professions. Daniel Boone could become a surveyor with no knowledge of trigonometry and very little of reading and writing. He would not be permitted to practice that profession today without many years of study. Even where there are no fixed legal or professional

standards, employers and the public are constantly demanding higher qualifications, based on training.

### **13. Experience a costly teacher**

The amount of knowledge required for the better positions is now too great and embraces too many widely separated subjects to be learned in the experience of any single individual. Moreover, that is a costly way to get many kinds of knowledge. It is far better and easier to learn from others' experience. For this we use books in which such experience is set down. Properly to use such books calls for a certain amount of preliminary education.

Millions of people in many lands, through long experience, have come to agree that, for most people, the minimum desirable education is about that represented by graduation from an ordinary high school. Until recently, if such an education was not obtained in childhood and youth, the opportunity to secure it was generally gone forever. Adults could not and would not study with children in ordinary day schools. The only other alternatives were unaided, monotonous, difficult study, or expensive private tutoring. Today opportunities are literally thrust upon everyone, and the difficulty is to choose which to take advantage of, and then to exercise the necessary will to follow up the choice.

## **Every Day Spent in School Will Pay You Nine Dollars**

**\$9.02   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$9.02**

### **HERE IS THE PROOF**

**Uneducated laborers earn on the average \$500 per year for forty years, a total of \$20,000.**

**High School graduates earn on the average \$1000 per year for forty years, a total of \$40,000.**

**This education required 12 years of school of 180 days each, a total of 2160 days in school.**

**If 2160 days at school add \$20,000 to the income for life, then each day at school adds \$9.02.**

**\$9.02   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$9.02**

**The child that stays out of school to earn less than \$9.00 a day is losing money, not making money.**

**\$9.02   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$   \$9.02**



## CHAPTER I

### Taking an Inventory

#### 14. What are your assets?

In the list of causes of bankruptcy the most frequent is "lack of capital." In the direct language of the street every such failure means that somebody "bit off more than he could chew." Someone tackled too big a job or did not know how to use all his resources. Many a failure in business and life might have been avoided by a careful inventory. When no inventory is taken in the beginning, the creditors are apt to be compelled to take one at the end for comparison with debts.

Every person entering a new occupation is in many ways like a new firm starting in business. He cannot choose wisely without an inventory of his resources and a comparison of them with the work he has in view.

Every person has valuable assets to invest in a new occupation. He has physical and mental as well as financial assets. Unless all are carefully listed, valued, and their capacity determined, some will certainly be overlooked, and a poorer choice than necessary accepted, or an impossible choice attempted. Many a life failure is due to ignorance of available assets.

Personal, like commercial, assets are both tangible and intangible. Every page of every life history is an asset or a liability. Every act left some impression, revealed or developed some weakness or strength, or taught a needed lesson.

Every person's education whether at home, in schools, or by experience in the shop, makes up a list of items



that should be inventoried before undertaking a new line of work. There should be expert appraisal of individual ability, and few of us are good judges of our own ability. Some abilities can be measured by simple mental tests. All can be checked by skillful comparison with other items in the personal inventory. We should never overlook desires, wishes, and ambitions. Often these have never clearly been thought through even by the person who possesses them. Often they can be determined only by the knowledge of things done in idle moments when consciousness is off guard so to speak.

### **15. Nothing in physiognomy**

None of these things can be determined with any accuracy by any of the highly touted systems of facial analysis or studies of head formation. People have tried these methods for a thousand years and more, and have made many shrewd guesses, but every time the actual number of successes and failures in prediction by this method has been tabulated, the result has been to show up its hopeless foolishness. However, much popular belief is inclined to the contrary, many years of tests by many hundreds of persons have proved conclusively that man's abilities, desires, educational qualifications, business experience, and practical ability are not shown by the shape of his head, the color of his hair, the texture of his skin, the complexion of his face, or the position of his features.

Wise choice does call for knowledge of the surroundings of the person who is to choose. Certain occupations are accessible with much less expense to the city dweller than to the resident in the country or in the small town. Some industries like the making of shoes,

automobiles, collars, and clothing are centered in a very few localities and the person who wishes to work in these lines must move to the cities where the industries are. It is necessary to know the amount of leisure that the person has and his willingness to use it for training. There should be knowledge of the educational opportunities available and the inclination of the individual to take advantage of them.

### **16. Preparing a list**

The first step in taking any inventory is to prepare a list. On the skill with which that list is prepared, on its inclusiveness and the accuracy of its divisions, depends the completeness and the value of the inventory. A list that enables any person to take an inventory of his assets with means of determining which are available to secure a better job has been prepared to accompany this book. It was prepared only after a careful study and comparison with many similar lists. The owner of a large business would not try to sit in his office and write from memory an inventory of all the goods in a big store or factory. He would know that he would overlook many assets if he tried this. So, he has a list which grows from year to year and is preserved to be checked against each year to be sure that nothing is overlooked.

The questions in this list are so formed as to locate assets that may well have been hidden from the possessor. For this reason, as great care is necessary in filling it out as if you were taking an inventory of the money in a bank vault. You are listing your most precious possessions to decide how you can best use them for the remainder of your life. The man who would pad an inventory of his business might fool creditors for a day

but he is on the road to destruction. Padding this inventory fools no one but yourself and may injure you deeply.

### 17. Checking assets against occupations

When this inventory has been completed, you are ready to check it against the various occupations. You then want to know what you can purchase with your assets. This book aims to list the goods available. Like every inventory of occupations, it shows constantly changing opportunities. Old occupations are disappearing and new ones arising. The automobile has created great industries and has wiped out a whole series of occupations.

The Advance Sheets of the Census of 1920 show some important changes which should be considered in taking a survey of occupational opportunities. There are almost two million less farmers than in 1910. This steady movement from the farm is a much more important fact in deciding the desirability of agriculture than any amount of preaching "back to the farm." It shows that in the opinion of those who know farming best, who are in the best position to enter the occupation and who can see all sides of it, agriculture is less desirable than many other occupations.

An examination of the table, page 21, shows that these two million went largely into the manufacturing and mechanical industries; at least these have gained more than two million workers in the decade. Almost another million went into trade and more than a million into clerical occupations. With an increase of over three million workers, all of the new ones and nearly two million of the old went into trade and industry, while farming and domestic and personal service are being deserted.

## Changes in Occupations

**Total Persons 10 Years of Age and Over Engaged in Gainful Occupations,  
Distributed by Sex and General Classes of Occupations  
1920 and 1910**

Sex and General Occupational Class	1920		1910	
	Number	Per Cent Distribution	Number	Per Cent Distribution
<b>BOTH SEXES</b>				
All occupations	41,609,192	100.0	38,167,336	100.0
Agriculture, forestry, and animal husbandry	10,951,074	26.3	12,659,082	33.2
Extraction of minerals	1,090,854	2.6	965,169	2.5
Manufacturing and mechanical industries	12,812,701	30.8	10,658,657	27.9
Transportation	3,066,305	7.4	2,637,671	6.9
Trade	4,244,354	10.2	3,614,670	9.5
Public service (not elsewhere classified)	771,120	1.9	459,291	1.2
Professional service	2,152,464	5.2	1,663,569	4.4
Domestic and personal service	3,400,365	8.2	3,772,174	9.9
Clerical occupations	3,119,955	7.5	1,737,053	4.6
<b>MALE</b>				
All occupations	33,059,793	100.0	30,091,564	100.0
Agriculture, forestry, and animal husbandry	9,867,000	29.9	10,851,581	36.1
Extraction of minerals	1,087,357	3.3	964,075	3.2
Manufacturing and mechanical industries	10,881,637	32.9	8,837,677	29.4
Transportation	2,852,043	8.6	2,531,075	8.4
Trade	3,574,435	10.8	3,146,582	10.5
Public service (not elsewhere classified)	748,716	2.3	445,733	1.5
Professional service	1,136,157	3.4	929,684	3.1
Domestic and personal service	1,216,151	3.7	1,241,328	4.1
Clerical occupations	1,696,297	5.1	1,143,829	3.8
<b>FEMALE</b>				
All occupations	8,549,399	100.0	8,075,772	100.0
Agriculture, forestry, and animal husbandry	1,084,074	12.7	1,807,501	22.4
Extraction of minerals	3,497	(1)	1,094	(1)
Manufacturing and mechanical industries	1,931,064	22.6	1,820,980	22.5
Transportation	214,262	2.5	106,596	1.3
Trade	669,919	7.8	468,088	5.8
Public service (not elsewhere classified)	22,404	0.3	13,558	0.2
Professional service	1,016,307	11.9	733,885	9.1
Domestic and personal service	2,184,214	25.5	2,530,846	31.3
Clerical occupations	1,423,658	16.7	593,224	7.3

(1) Less than one-tenth of one per cent

A study of thirteen states, for which the detailed figures for occupations were available at the time this was written, gives a closer view of this movement. Since these states are scattered over the entire Union and include samples of nearly every type of industrial development, the results shown by them may be taken as typical. The following tabulation gives the tendencies of the principal occupations in these states.

Increasing	Decreasing
Agents, canvassers, and collectors	Barbers
Bankers, brokers, money lenders	Blacksmiths, forgemen, hammermen
Bookkeepers, cashiers, accountants	Carpenters
Chauffeurs	Clergymen
Commercial travelers	Draymen, teamsters, expressmen
Designers, draftsmen, inventors	Engineers (stationary)
Electricians, electrical engineers	Farmers
Foremen and overseers (manufacturing)	Farm laborers
Insurance agents and officials	Laborers in blast furnaces, steel mills, buildings and steam rail- roads
Janitors and sextons	Lawyers, judges, and justices
Machinists, millwrights, and tool- makers	Molders, founders and casters
Managers and superintendents (manufacturing)	Painters, glaziers and varnishers (building)
Plumbers and gas and steam fitters	Physicians and surgeons
Salesmen and saleswomen	Teachers (school)
Telephone operators	
Nearly stationary	
Compositors, linotypers and type- setters	
Musicians and teachers of music	
Retail dealers	

A study of these groups of occupations shows that they belong to two distinct types. Those that are increasing are concerned with manufacturing, transportation, trade, or with the growth of great cities dependent upon industrial and commercial occupations. These are the growing lines of opportunity.

Any person considering entering an occupation should take these facts into his calculations. Such changes also vary according to locality, and a proper inventory of opportunities will include a local survey, unless you have no objection to changing your location. It is not hard to determine whether any industry is growing or declining in a certain neighborhood. In a growing industry there is generally a deficiency of trained men, while in a declining one, if the number of persons entering the occupation remains constant, there is apt to be a surplus of qualified workers and a sharper competition in obtaining positions.

Studies made of choice of occupations by boys and girls in high schools show that these facts are seldom taken into consideration. While the number of persons required for professional service is only 5.2 per cent of the population, more than 30 per cent of the boys and girls studied in a survey of Wisconsin high schools intended to go into one of the professions. On the other hand, while the mechanical and manufacturing industries call for 30.8 per cent of the population, only 6 per cent indicated an intention of entering occupations in these industries.

These are fundamental facts which should be considered whenever a change of occupation is contemplated. Of course they are not decisive. There are still many opportunities in the declining occupations. Agriculture still employs more than ten million people, and it would be foolish to exclude this field from consideration in choosing a life work. The important thing in every choice is to see that all possible facts are weighed before the decision is made.

## **Distinguished Men of America and Their Education**

**With no schooling**

**Of 5 million, only 31 attained distinction.**

**,**

**With Elementary schooling**

**Of 33 million, 808 attained distinction.**

**—**

**With High School education**

**Of 2 million, 1245 attained distinction.**

**—————**

**With College education**

**Of 1 million, 5768 attained distinction.**

**The child with no schooling has one chance in 150,000 of performing distinguished service; with elementary education, he has four times the chance; with high school education, 87 times the chance; with college education, 800 times the chance.**

## **What is Your Chance?**

## CHAPTER II

### **Leadership**

#### **18. Leaders greatest need**

Modern industry pays any price demanded for competent leadership. The person who can add the power of leader to his other abilities is on the road to promotion in almost any direction he may desire. It is a general rule that the more brains a person mixes with his work the higher the reward and the greater the pleasure of the work. We may look upon industry as divided into stages. In the first, muscle alone is of importance; in the second, skill gained by experience adds to the joy of the work and the income of the worker; in the third, special training and study give a higher degree of individual power and reward.

Above these three stages, there is a fourth where the individual adds to his own capacities the power to use the abilities of many others. This is the ability for which an industry of today has the greatest need. In the days when work was done by individuals or in small groups, leadership was of far less importance. Today, when hundreds, thousands, and even millions of men and women are organized in producing groups, the need for this power of organization is intense and is correspondingly rewarded.

#### **19. Industry a grouping of groups**

A modern industry is a combination of many small groups working together. Each one of these groups calls for a man with the qualifications of leadership. The leader must not simply be a person of greater intelligence



than those whose work he organizes and directs. He usually has greater intelligence, just as a foreman usually possesses greater trade skill than the men whose work he directs. But the leader must not only have intelligence, as it might be measured by mental tests, but he must have intelligence of a peculiar kind required for leadership. He must be able not simply to dominate, command, and discipline those around him. Indeed, industry is just learning that such a form of control in industry is very wasteful and that there is a sharp contrast between domination and leadership. The leader must be able by his ability to organize the work to fit each one into effective groups and to add to the productive power and personal pleasure of each member of the group. We are all willing to work with a leader who will help us to do more and to live happier.

It has been said by those who have made a careful study of leadership in industry that more than 70 per cent of the work of a modern executive is dealing with men. A man may know the technical side of a business; he may be a trained engineer with the greatest facility in mathematics, drafting, chemistry, physics, and the other fundamentals of his profession; he may know finance, banking, and the movements of the markets. All this knowledge can be put into action only through other men; he cannot himself run all of the machines of a modern industry. He must make others want to run them. This fact is now recognized by all the great engineering universities. In the beginning these all taught only the mechanical and the individual skill side of the profession. When these men went out into the world of industry, they found that they were no longer working with graphs and symbols or mathematics, with the equipment of a

laboratory or machine shop, but with human beings. The universal complaint made of engineering graduates by successful executives was that they "could not handle men." They were consequently required to take an apprenticeship of several years in much lower positions than those for which their university training had equipped them in order to learn this most important lesson of leadership in industry.

## **20. Human engineering**

When men like Frederick W. Taylor first discovered the tremendous wastes in industry, they thought it was only necessary to draw up systems of time and motion study, planning boards, and similar more or less mechanical methods of controlling the movements of men, material, and machines, and then by means of records and a few instructions introduce these systems into industry. Before long, it was discovered that all these schemes had overlooked one very important factor—the human one. Those who introduced them had not stopped to consider that they had to be carried out by human beings, whose abilities, desires, habits, and prejudices were an even more important part of the problem than the stop watches, machines, high-speed steel, card catalogues, and planning boards.

As a consequence, the modern management engineer, if he is to be successful, must spend as much of his time in studying the effects of his plans upon the human beings concerned and upon methods of interesting and training the persons who are to carry out his plans as he does upon his analysis of the arrangement of machines, the routes of travel for work and material, and the systems of recording results.

The possession of this ability to lead is an essential qualification of every step in promotion above that of the skilled worker at a trade. It is of fundamental importance as a qualification for foremanship. For every step in the line of executive promotion, the element of leadership grows in importance relative to all other qualifications.

It is commonly said that the first qualification of a leader is to know human nature. Human nature is simply the minds of people. Knowing human nature is knowing what people think and do. This is what is commonly known as Psychology. The person who is to be a leader must know something of Psychology, even though he does not study it under that name. He must know that every person is a bundle of instincts, emotions, habits, and intelligence. He must know something of those elements and how they work. In some cases this is learned by long and painful experience, but there are now courses in Psychology in relation to industry that will save much of the pain in experience.

## **21. Fitting groups together**

The leader deals with groups, and the person who lives in a group, as most of us do during a large portion of our lives, must adjust himself to that group. He must fit his desires, habits, and abilities into the corresponding qualities of others. To help him do this is one of the most important duties of a good leader. The person who is fitting himself for promotion should know something of the way people live in groups. He must know how industrial groups are organized; what are the powers, duties, and responsibilities of each person in the group in relation to all the others. Such knowledge is useful in every executive position.

An executive is not a person who does things himself but one who gets others to do them. It is possible to plan for leadership from the beginning and to train for it conscientiously and intelligently just as for any other position desired. The person who is to do this should watch his effect upon others and the position he occupies in all the groups of which he is a member. How did he get on with the ball team as a boy, with the corner gang, the Sunday school class, or the boy scout troop? Was he one to whom the others appealed? Was he chosen as captain or other leader? Did he find it easy to work with other people, and, what is more important, did the other people seek to work with him?

In every form of leadership there are certain definite things that must be present. The leader must lead; he must be ahead; he must guide; he must have initiative; he must know where he is going, what he is going to do; he must be willing to accept responsibility, and confident of his ability to carry out his decisions. He must be willing to accept advice and to consult with those whom he leads. The day of the autocrat in government, education, or industry is rapidly disappearing. He is disappearing because he is inefficient, and he is inefficient because no one person possesses more brains than all the others in a group, and certainly no leader is using all the brains available unless he adds to his own knowledge that of all the members of a group. The leader of every group must dispense uniform justice. He must apportion work, and often rewards and punishments. He must do this in such a way as to further the purpose of the group. In industry, he must select persons for the positions where they will produce the most good with the least friction to the remainder of the group, and with most pleasure to themselves.

Jobs that deal with leadership are, everywhere, the most desirable. They offer the pleasantest work to those who do not fear responsibility or hard intellectual labor. They can be pursued through a long life, and they afford the greatest scope to that creative impulse whose gratification is one of the greatest sources of happiness.

## CHAPTER III

### Professions

#### 22. What is a profession?

It is hard to give an exact definition of a profession as distinguished from a trade. We all know the difference exists, and most of us would rather be a professional man than work at a trade. The difference is partly one of degree. The person following a profession is supposed to have a special training that is often so standardized as to be embodied in law. Doctors, lawyers, dentists, certified public accountants, and some other professions are required in most states to pass certain standards of scholarship. In the case of the engineering professions, these standards are fixed by powerful professional associations which will not admit anyone to membership who does not possess the required qualifications.

Each profession has its own system of ethics. The lawyer and the doctor, for example, must not betray the confidences of their patient or client. They cannot be compelled to tell what took place in a consultation even in order to punish a criminal. In some cases these systems of ethics have stood for many hundred years. Such are the principles of the "oath of Esculapius" which most physicians still take on graduation. Many of the principles that govern the legal profession have been enacted into law.

Such high standards are necessary because professional service is always personal service. Its value depends upon the qualifications of the person giving it. His services are worthless if he does not honestly give the best that is in him. He sells knowledge rather than work. His services

would be of no value without the knowledge and, on the other hand, if those who sought it knew enough to judge whether he had this knowledge, they would not need his services; therefore the public insists that his possession of the ability required be certified to in some way after competent examination.

### **23. Limits on competition**

The professional man is limited in his forms of competition. He is not permitted to advertise as freely as a seller of commodities. Underbidding of competitors, instead of being a virtue, is condemned. His competition should express itself in improved service.

There is a tendency for the number of professions to increase. It is not so very long since there were but three learned professions—the law, the church, and medicine. Now similar standards are being applied to other occupations.

Preparation for a profession cannot be obtained by experience on a job. The knowledge required is too great. No lifetime would be long enough to gain it by experience. It must be collected in books and in the minds of professional educators, each of whom has specialized in some narrow portion of the profession. This means that the training must be obtained by special effort. There must be a period of intense study, made possible by relief from productive work. This relief may come through the contribution of parents or others, or it may come from the savings of the person who is getting the education. Somebody must save money which can be turned into opportunity for education. The same result is produced by making use of the leisure time remaining from an ordinary occupation, or by working part time to earn a living while

the main effort is devoted to education. Each year a larger percentage of the students in universities and other institutions of learning earn their way either by outside work while studying or by alternate periods of work and study. The person who is preparing for a profession can make excellent use of some of the so-called "dead-end jobs" as a means of getting a living while studying.

#### **24. The step from crafts to the profession**

Entrance into a profession is often a possible choice for persons engaged in the crafts. Many of the most successful lawyers, dentists, engineers, and other professional men of today obtained their training while working at some of the ordinary more or less skilled trades. Correspondence and night schools offer exceptional opportunities for such training. By making use of them, the time given to unproductive preparation may be greatly shortened.

The study required for professional work demands exceptional mental abilities. The mental examinations of the men in the National Army showed that only about forty per cent of the population is capable of completing the courses of intensive study required for the best professional preparation. It is also true that those who have the ambition and determination to pursue such studies usually have the necessary mental capacity. In other words, there is what the psychologist calls a "close correlation" between mental ability and the will power and persistence necessary for professional education. For these reasons mental tests are especially valuable as a guide to probable success in a profession.

Mental tests will not give an absolute answer as to just what person can take university work. They will tell



for which ones it will be more difficult and predict the probability of graduation with great accuracy. If study is difficult, if you were retarded in the grades without sickness or other handicap, if mathematics is especially hard and textbooks unattractive, you should take a psychological examination before trying to study for a profession. This will at least make clear the difficulties and the probabilities of success.

## Physician

### 25. The sentinel of society

The doctor is the sentinel guarding the community against sickness and death. Into his hands we must trust what we value above everything else. The physician who is not worthy of this trust, who deceives his patients, exaggerates his own abilities, or sets financial rewards above his professional integrity, deserves, and will sooner or later receive, condemnation and ostracism. Because he must constantly match himself in a fight against death, he should not enter the profession with any reservations as to the things he is willing to do to win that fight. The medical tradition of centuries has created a code of ethics for the physician much like that of the soldier. He dare not draw back from the fight against the enemy—disease—no matter what the cost to himself.

Legal standards of preparation for this profession are steadily becoming higher. The number of states requiring preliminary education before the medical course increased from twenty to twenty-six between the years 1904 and 1919. Thirty states now require four years of medical college work and eight states from one to two years of preliminary college work. Forty-four states require that all candidates for license be graduates of legally chartered schools, and every state in the union requires an examination by those who seek license to practice medicine, unless they hold a license granted by some other state.\* The person who expects to become a physician must have at least a high school education, and then take from four to six years of very expensive college work. In many places

\* Address State Board of Health at capital of any state for exact laws

he will not be given full recognition in the profession until he has taken from one to two years of additional work as a hospital interne, or in a graduate school, or both. He must have excellent health and considerable power of endurance if he is to make his way as a general practitioner, which is almost always required at least for the first few years after entering the profession.

After all this preparation, what may he expect? One of the best medical schools in the country is that of Harvard University, and the average earnings of its graduates through a series of years are shown in the following table.

### Physician's Income

Average Earnings of Harvard Medical Graduates, by Classes and by Years of Experience\*

Year in Practice	Classes									
	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
First	\$ 866	\$ 787	\$ 541	\$ 362	\$ 625	\$ 502	\$ 350	\$ 533	\$ 425	\$1,237
Second	827	1,089	790	995	773	826	588	1,250	874	1,083
Third	1,181	1,539	1,412	1,295	995	1,262	1,353	1,025	1,370	1,578
Fourth	1,505	1,694	1,720	1,566	1,559	1,765	1,963	1,575	1,632	1,835
Fifth	2,027	1,556	1,966	1,981	1,818	2,359	2,347	1,847	2,150	
Sixth	2,341	1,837	2,333	2,277	2,347	2,997	3,202	2,360		
Seventh	2,527	2,161	2,654	2,967	3,043	3,650	3,545			
Eighth	3,003	2,491	3,155	3,043	3,337	4,332				
Ninth	3,560	2,900	3,616	3,604	4,500					
Tenth	3,524	2,963	4,135	4,535						
Eleventh	3,885	3,691	4,604							
Twelfth	4,422	4,130								
Thirteenth	4,680									
Maximum number of men..	18	19	29	19	33	26	29	29	25	26

\*Training Records of the Physician (Cabel). J. Lippincott Co., Philadelphia, Pa., p. 136

The amount of annual income has undoubtedly increased since this table was prepared, but the relative proportion has changed but little, and the relation to the cost of living is probably about the same.

**26. Must be strong and cheerful**

The physician must have a strong and vigorous body. This is not only because his hours are long and irregular and he takes no heed of weather, but also because his very presence and personal appearance should carry confidence to the sick. He dare not be a "grouch." He must be patient under the most aggravating things. He will not go far unless he is a hard and continuous student. In no profession is progress more rapid, and the doctor who does not keep up is doomed to personal and professional defeat.

If he specializes in surgery, he needs strong and steady hands with almost super-mechanical skill. If he specializes in other lines, he will need even more intense study than as a general practitioner, because as a specialist his value in the profession consists of his superior knowledge.

At the present time there is general agreement that the profession is greatly overcrowded. The United States has nearly ten times as many doctors per thousand population as Germany, and there is no suggestion that the latter country is undersupplied with physicians.

The person who enters the medical profession on the same basis that he would enter business, simply to make money, would better turn his talents in other directions. If, on the other hand, he has a sense of social service and enthusiasm for humanity, a willingness to sacrifice his own comfort and perhaps his life, that he may add to the lives of others, and is willing to take a large portion of his reward in the satisfaction that comes from achievement, then he may well enter the ranks of physicians.

**27. Winning the fight with disease**

Year by year the medical profession has fought back the death specter until today the expectation of life is very

much greater for us than it was for our grandfathers. Some diseases have been almost abolished from the earth, and the ravages of others reduced until the toll of human lives they now exact is but a small fraction of that taken a few centuries ago, while victory over many others is in sight.

The work of the physician has grown greatly within recent years and has taken on a new character. It is becoming concerned more and more with prevention. It is also becoming more highly specialized.

The development of sanitation and legislation in care of the public health is calling for a new type of medical education. Every city of any size and many rural districts now have public health physicians. These are concerned with the care of the public health by preventive measures. This line of work, like all those about to be described, really offers choices of occupation for those who already have entered the profession. The doctor who wishes to fit himself for public health service should study housing, water supply, sewage disposal, care of food products, marketing, public administration in general, and the rapidly growing code of health laws, national, state, and municipal.

## **28. The industrial physician**

The new occupation of industrial physician will call for many men and women during the next generation. The physician who prepares himself for this work will enter upon an, as yet, uncrowded occupation with splendid opportunities for individual success and social service. Employers are learning that the health of their workers is something in which they as well as the employees have a direct concern. There is a real identity of interest here

between employer and employee. Workmen's compensation laws, with their constantly rising standards, are increasing the demand for industrial physicians.

Preparation for this work includes a training in Employment Management and Safety Engineering. This involves a knowledge of methods of hiring, promotion, job analysis, preliminary physical examination, safeguards against occupational dangers, and the general care of the health of the employees of an industry. The industrial physician must make a study of occupational diseases; he must know industrial insurance and something of business management. He must be able to advise on housing, sanitation, and the management of company restaurants. Of especial importance will be a knowledge of a little explored field of American industry—that of the effect of fatigue and working conditions upon employees. He should know how to organize a health department for an industry, and its place in the industrial organization, with its relations to all other departments of industry.

## Lawyer

### 29. What the lawyer does

The legal profession gives great rewards after hard work to a few, and smaller rewards than most skilled handicrafts to the great majority. The high prizes hung out for a few, the social honor conferred upon the profession, the opportunities it gives in political and business life, and the fact that our educational system has been too largely directed towards fitting men for it, has caused this profession to become greatly overcrowded. Nevertheless it is one that many will choose; but it should be selected only with a full consideration of the preparation needed, work to be done, and possibilities of success.

The Vocational Bureau of Boston, Massachusetts, describes the work of the lawyer, as follows: "The lawyer spends a part of his time in studying law, reading statutes, decisions, reports, and treatises. The printed decisions in various states range from one to eighteen or twenty volumes a year. With these and other legal material the lawyer is bound to have some acquaintance. Furthermore, the lawyer spends part of his time studying miscellaneous topics which become the subject of litigation, such as street paving, the coal business, the chemistry of wall paper, and so on. Every science may have something to say to the lawyer. Part of his time is spent in consultation with his clients; first of all to ascertain the facts of their cases, and afterward to explain to them their rights on the facts. He also spends time in writing letters and doing sundry business incidental to giving advice to his clients. This work for the client branches out into a search for missing witnesses, examination of records of deeds to discover the ownership of real estate, the perusal of the ac-

count books of a client to find out the balance of a claim or similar investigation. Furthermore, part of his time is spent in writing pleadings and briefs; the pleadings are the statement of claim or defense made by him to the court; the briefs are his written arguments of law giving the legal reasons why the law favors his client's case. Finally, he spends much of his time in arguments to the judge and jury, and in the examination of witnesses and other proceedings in court. Here, as in all occupations, nine-tenths of the work is what may be called routine work or even drudgery. This cannot be escaped. The lawyer does not spend his time in preparing and delivering eloquent orations. As in other occupations, the really interesting work, full of perpetual zest, is usually a small part of the whole."

### 30. Standards of admission

Few professions are more difficult to enter. The expense of a legal education is very high, and the standards are constantly rising. The legal standards as set by the various states are given by the Federal Board for Vocational Education, as follows: "Each state has its own bar or legal society and admission is granted to the applicant in accordance with the regulations in force in each state. Twenty-eight states have an examining board; nineteen states require approximate completion of a high school course; seventeen states prescribe no definite period of study; one state prescribes a period of eighteen months; twelve states prescribe a period of two years; twenty-three states prescribe a period of three years; and ten states accept graduates of certain law schools without examination."\*

\*Exact qualifications in each state may be found out by addressing the Attorney General at State Capital.



Before such an expensive system of education is undertaken, the person who is considering the choice of the legal profession should decide whether he possesses the mental equipment required. He must have a more than ordinarily keen mind, not only in order to get full value from the training, but in order to be successful in practice. Law is, above all else, a clash of minds, and unless you are sure that your mind is far above the average, there is little hope of success in the practice of law.

### 31. The lawyer's income

What may be expected of the graduates of one of the best law schools in the United States is shown by the following table taken from the U. S. Bureau of Education investigation of graduates of the Harvard Law School:

Year	No of Replies	Average Earnings
First	694	\$ 664
Second	609	1,110
Third	497	1,645
Fourth	411	2,150
Fifth	317	2,668
Sixth	249	3,118
Seventh	162	3,909
Eighth	112	4,426
Ninth	62	5,321
Tenth	40	5,825

NOTE:—This table probably gives too favorable a view, as those with a small income would be less apt to reply to the questionnaire.

While nearly every community can show one or two exceptions of old lawyers who have been very successful without high school preparation or college training, yet the number of young lawyers who can hope to meet much sharper competition and succeed without such preparation is very few indeed. No one should undertake a law course

without a high school training. If the law training is to be taken by correspondence or evening schools, it should be accompanied by practical work in a law office. After graduation there is always a long probationary period which has not been inaptly termed "the starving period."

There is, however, another side to the law work. Legal training is of very great value to many persons who never expect to practice law. A mastery of law places in one's hands a powerful weapon to aid him in winning success in business, in statesmanship, and in politics. In a democracy like ours, or in a constitutional government like England's, the lawyer and the judge hold a more enviable and influential position than they do under any other form of government, because in these countries the power of the law is supreme and superior to the will of royal families, military cliques, or other ruling classes. In other words, in the United States, as in England and her colonies, we have a government by law, whereas, in a monarchy, we have a government by men. In a democracy the lawyer is a man of power, and the scope of his activity and the range of his influence reach from the simplest transactions and the humblest persons to the most exalted and powerful government officials.

### **32. Always under law**

From the time a man leaves his home in the morning until he returns in the evening his every act is controlled by law. His rights upon the sidewalk or the street are minutely defined. If he is injured by a defective walk or street, the law gives him a remedy against the city or the property owner whose negligence is responsible. When he enters his automobile, he has definite rights in relation to pedestrians, drivers of other vehicles, and the police power

of the city governing the use of the streets. If he travels by street car or railroad train, legal rights and remedies envelop him on every hand in respect to his ticket or his cash fare, the carelessness of the engineer, motorman, conductor, or the man who may have neglected to turn a switch or repair a wheel, and the liability of the company for safe carriage of his person and property.

When he reaches his office or his shop and begins his day's duties, another group of legal principles comes into play. In discussing business or professional matters with customer or client; in talking over the telephone; in sending or receiving letters or telegrams; in signing or indorsing checks or promissory notes; in writing receipts, orders, invoices, and statements of account; in drawing up contracts, bills of sale, mortgages, leases, and other legal documents common in business; in the ordering, receiving, and collection of accounts; in transactions with bankers, brokers, and professional experts; and in the minutest detail of the day's work, he is controlled by law.

### **33. Lawyers needed everywhere**

As a consequence, the lawyer's advice and skill are essential in almost every business, community, and government enterprise. Before any important project is organized and put into operation, the wise counsel and assistance of a good lawyer are necessary to insure conformity with the law. This is no less true of business than it is of the work of the lawmaker in a city's council hall, in the State Legislature, and in the Congress of the United States.

"I would give a million dollars to be a good lawyer," said Harriman, the railroad king. Early in his career, his business and financial experience convinced his keen mind

that a legal training is almost indispensable to the man who wishes to succeed in "big business." It is safe to say that at least half the men who attend law schools are studying with the intention of entering upon a business career. A large proportion of such students are the sons of business men, who learned through hard experience that they were seriously handicapped because they did not know the law, and who wish to give their sons advantages which they themselves did not enjoy.

#### **34. Lawyers in business**

Many law-trained men enter business because of the enormous incomes sometimes earned by business men. Gary, of the United States Steel Company; Runnels, of the Pullman Car Company; Lovett, of the Union Pacific; Hale Holden, of the Burlington; Depew, of the New York Central; Edward Bok, of the Ladies' Home Journal; Hulburd, of the Elgin Watch Company; all are striking examples of successful business men whom a knowledge of law has helped to high positions. Leaders of great industrial organizations seek far and wide for men who have the mastery of both law and business necessary to conduct the business safely and protect the rights of all parties concerned. For fitting a man to handle big business problems a legal education has no superior.

The Government of the United States is dominated by lawyers. The leaders of both Houses of Congress are members of this profession. Every state legislature, political convention, and city council is controlled by lawyers. Seventeen of our twenty-eight presidents had a legal training, and a host of other public men might be named who have risen to an exalted position in public life because of their peculiar fitness to handle the intricate problems of law and public administration.

## Teaching

### 35. Widening field of education

We are in the midst of a revival of learning, a veritable Renaissance, in some ways even greater than that which swept over Europe at the close of the Middle Ages. The world, after having placed its faith in machinery of government and industry, has learned that the more complex the machinery, whether in government or manufacturing, the greater the intelligence needed to operate it. It has come back to a recognition that knowledge is power in every line.

The war demonstrated the value of education and the weakness of ignorance in all these fields. America was startled when the draft revealed that the majority of our population had passed only the sixth grade and that nearly twenty-five per cent are practically illiterate. Industry suddenly awoke to the fact that lack of education and technical training are handicapping progress and restricting development in every line.

Along with this came a strengthening and broadening of the idea of the field of educational work and educational institutions. Cities, states, and nation rivaled one another in new educational measures. Schools and colleges were for the first time crowded far beyond capacity. That this movement will grow in strength seems almost certain. Modern citizenship joins with industry in insisting upon a higher minimum of education. Greater interest in education, compulsory school laws, and developments like continuation schools and industrial training, all point toward the time when high school graduation will be considered essential to any citizen's education.

All this increases the demand for teaching and brings with it new duties and new opportunities. The field of education naturally divides, according to subject matter, into those that are concerned with "arts and letters," as they have long been known, and the new vocational training. These fields tend more and more to overlap, but the division still exists for practical purposes.

Scholastic education, in both public and private schools of the old type, is still only slightly modified by the new spirit. These schools have through long evolution developed a standard form. There are the eight grades, followed by the four years of high school, all leading to university entrance rather than preparation for life work.

### **36. Women dominate lower grades**

There is a tendency in many places to change this form of organization by establishing "junior high schools," usually covering the last two years of the grades and the first year in the high school. In some instances "junior colleges" carry the work of the high school through the first two years of university work. In the first eight grades teaching has been given over almost entirely to women. There is a tendency to react against this as many educators feel that a more equal division of the sexes is desirable.

In the high school, women still dominate. Specialization becomes more important. Few teachers are employed in the best high schools unless they have had special training in the subject they are to teach. A university degree is being insisted upon with some training in pedagogy. In the high school there is an opportunity for promotion to principalship.

### **37. What the principal does**

The duties of the principal are something quite different from those of the teacher. He is an administrator, manager, organizer, leader of an educational plant group. He is concerned with questions of discipline, with the organization of a curriculum, and with the direction of the multifarious activities that have grown up in the modern school.

As yet there has been only a mild recognition of the necessity of these qualities for the position of leadership and only the beginning of opportunities for specialized training along these lines. The man teacher in a high school who wishes to fit himself for the position of principal should realize that the position to which he aspires, like that of an industrial executive, calls for knowledge of a new trade in addition to that of teacher. He should learn that trade as a preparation for promotion.

### **38. University faculties**

In the university field men dominate almost as completely as women in the grades. This is the field of the highly specialized scholar. It gives great opportunities for leadership, which, it must be admitted, are seldom used. There is, moreover, great lack of pedagogical training. One of the indictments that is brought against university work is the incapacity of specialists to teach what they know and their failure to recognize the fact that teaching is a different profession from that of the investigator.

Throughout the whole educational field, but as yet most prominent in the high school and grades, there is growing a new set of duties for teachers, based upon a new technique of education. There is a demand for more ac-

curate measurements of mental ability and educational achievements, more accurate records and better standardized methods of meeting all the problems of administration.

### **39. Put minds in men, not in machines**

The field of vocational education is growing more rapidly than any other. Industry all along the line is recognizing its need for trained minds. It has discovered the fact already mentioned that trying to put minds into machines and neglecting those already existing in human beings is deadly to society, to industry, to humanity, and perhaps what may give an even greater tendency to quicker action, deadly to profitable management of industry.

The nations that educate their workers are growing in power and leaving behind the competitors that put their faith in inanimate, clever contrivances. Recognition of this fact showed itself simultaneously in two lines—in the schools and in industry itself. Many of the large industries, such as the General Electric, the Westinghouse Company, the telephone companies, and some of the railroad systems now conduct extensive educational work for their employees. The extent of this movement is shown from the fact that nearly two hundred of the largest firms in the United States have formed the National Association of Corporation Training to consult how they can improve their work of education. Hundreds of firms outside this association are conducting some form of training.

### **40. Vocational education**

On the other hand, the schools are being transformed to meet this new demand. Nearly every city has, within



recent years, introduced some form of technical education into its school system. Hundreds of private resident and correspondence institutions are working in the same field. The Federal Board of Vocational Education, created during the war and duplicating the financial contributions of the states, has brought about the beginnings of vocational training in every state previously indifferent, and quickened activity in those already at work. The rehabilitation of wounded soldiers gave another impetus in the same direction. It was found that special training of the minds often more than offset the loss of limbs in productive value.

This development means that henceforth there will be a much wider field of opportunity for teachers. It means new and, in some ways, higher standards; and it will mean better salaries for those who meet these higher standards.

#### **41. Who can do this work?**

This new field of vocational education offers special opportunities to two distinct classes: first, to teachers already in the public schools, and second, to workers in industry. Any person occupying either of these positions should consider the possibilities of vocational teaching. The school teacher desiring to enter this new field must use his leisure time in preparation. He must gain actual shop or business experience during his vacation and familiarize himself with the practical and theoretical technique of the subject he wishes to teach. He can usually take shop courses by correspondence and accompany these with some shop or commercial experience.

The carpenter, machinist, mason, printer, or other skilled craftsman has the same opportunity. There is a tendency to prefer the teacher who enters from the craft

into the profession over the one who comes through the teaching profession into the craft. Both must, however, remember that the teacher in this field must know two trades, or a trade and a profession. He must know the trade whose subject matter he is going to teach, and he must know the profession of teaching in order to be able to get his knowledge across from his own mind to that of the pupils.

Unless these two kinds of knowledge are possessed, failure will result, no matter from which side promotion is sought. Every worker in the field of vocational education is agreed that the whole movement is clogged by the inability to find teachers who combine craft and pedagogic knowledge. Those who have only one kind of knowledge are only half trained.

#### **42. A steady job**

The work of the teacher is little affected by seasonal changes or financial and industrial upheavals. The hours of actual teaching are comparatively short, but the teacher who does not use his evenings to good advantage is on the road to failure. Vacations are regular and liberal, but again it must never be forgotten that constantly rising standards demand that the teacher use much of his vacation time for study. Many school systems make promotion contingent upon attendance at some educational institution during the summer vacation.

Advance is not so much from one position to another as by predetermined increases in salary. Such increases are much more frequent in large cities than in the country and small towns. This is due, in part, to the fact that the labor turnover in the latter locations is so high as to make any sort of continuous position difficult, if not impossible.

Teaching in the past has been looked upon as a stepping stone to other professions. Young graduates entered it with the intention of spending two or three years while looking around for a real life occupation. The high percentage of women teachers who remained only until marriage made this instability still greater. There is a growing tendency to make tenure more permanent and to bar those who plainly intend to use teaching only as a temporary stop gap.

#### **43. Educational leaders**

The qualifications for the profession of teacher must be high. He is the educational leader of the community, and unless he is better trained than the majority, he cannot function. The teacher needs a sound body, level nerves, a boundless supply of patience, cheerfulness, and a great capacity for leadership.

Educational qualifications are rising. It is true that many states still grant certificates to those who have little more than a grade school education, but generally only one annual certificate of this grade will be granted to any person. During this year the teacher must prepare to meet a more difficult examination.

Many states and some cities have established normal schools, graduation from which secures preferential consideration in hiring. Another tendency toward assuring greater permanency is the willingness of many cities to welcome married women as teachers. It has been said that the youth of America are taught by young girls and "biological misfits." The teacher should not be set apart from society. He or she should have a part in all normal social relations. Unless this condition exists the teacher cannot properly perform his function of intro-

ducing the youth of the people into the social organization. This introduction, it must always be remembered, is the reason for the creation and maintenance of any system of education.

#### 44. Social service in education

The recognition of the wider field of social service arising out of the fact that many schools are becoming social centers for all neighborhood activities is affording new opportunities to such teachers as have the qualifications demanded for such positions.

Rural school teachers have hitherto been compelled to hunt for boarding places among the families in the neighborhood. The obvious undesirability of such conditions has led to a move in several states to erect official residences for the teaching staff close by or connected with the school building. This action is preceded by a consolidation of several districts, and the school and residence building is so constructed as to provide opportunity for all community activities.

For such schools the new type of teacher already mentioned is essential. He must be a leader, an organizer, a social worker, as well as an educator. He must be able to make the school a center of social life. He must know the educational industrial needs of the community, and be able to adjust school work to meet those needs. He must be impartial between political factions, but intelligent on all public questions. He or she, for some of the best work in such schools has been done by women, must become a real center of all educational activity, and must realize that education applies to every field of life and every age and station, as well as to teaching the "three R's" to children.

#### 45. New view of teaching

This new phase of education which is extending into every school is restoring the teacher to that position of social leadership which he shared with the minister and the priest in previous centuries. This movement is affecting every grade. One phase of it was seen in the greater prominence which university men obtained in the War. It has often been said that the War was fought as much in the laboratories of the warring nations as in the trenches. It is seen in the increasing tendency to call upon the highly trained men of the universities for expert advice in government and in industry.

Such a view of education, making of the teacher the real leader, organizer, and adviser in the fields for which his knowledge fits him, is one which should encourage choice of this profession. There is the more reason to enter this field because it is one in which there is a great deficiency of qualified persons. The number of teachers in proportion to the demand has steadily declined for nearly a generation. Today anyone equipped for the work may be sure of continuous employment.

As to the wages offered, the Federal Board for Vocational Education gives the following figures: "The beginning wage for men teachers in rural schools ranges from \$60 to \$90 per month. The beginning wage of men teachers in the graded schools in cities is considerably more. The minimum salaries of all teachers, men and women included, in eighty-five of the largest cities in the United States, ranges from \$405 to \$1,080, whereas the maximum for such teachers in the same cities ranges from \$630 to \$1,820. Teachers in industrial arts receive from \$1,000 to \$2,500 a year, while supervisors of such subjects receive from \$1,000 to

\$3,000 a year. Salaries paid state and local directors for administering vocational instruction range from \$2,500 to \$5,000. Principals and superintendents of schools generally receive salaries ranging from \$1,000 to \$4,000, and in some of the larger cities salaries for superintendents have recently been materially increased. During the past three or four years some superintendents of our largest cities have been getting from \$10,000 to \$12,000."

### **Journalism**

#### **46. Variety of opportunities offered**

There are more than twenty-five thousand periodicals in the United States. Some are published a dozen times a day; others appear but once a year. Some are circulated by the millions of copies of each issue; others less than a hundred. Some are vulgar, cheap, trashy, inane, and forgotten as soon as read; others contain inspiring words, great truths, scientific discoveries, or lines of classic beauty destined to live and influence all coming ages.

The preparation of the material that appears under all of these forms is the work of the journalist, though he is known under many names—newspaper man (as a great majority on the daily and weekly press prefer to be called), writer, author, editor, reporter, copy reader, or correspondent. His work takes on as many forms as the worker has titles, but always it is in some way concerned with preparing material to be printed. When journalism is mentioned, most people think of work on the great metropolitan dailies. There are really but a few of these compared with the host of smaller periodicals or with those of less frequent publication.

The work on the big dailies is highly subdivided, and there is no standard form of organization or title which applies to any large number of them. The highest person in authority is the publisher, who is usually the owner of the paper. Where the ownership is vested in a corporation, the publisher is not a part of the organization. In the actual working of the paper there is more frequently an editor-in-chief, who is sometimes also the publisher and who is the responsible head, determining policy on all matters not decided by the Board of Directors or owners.

The management of the paper then divides under two heads: the editorial writers, who are concerned with the handling of most of the matter that goes on the editorial page, and the managing editor, who controls the rest of the paper. Sometimes the editorial writers are also under the managing editor. The managing editor controls the news gathering and publication. Under him is a variety of editors according to the organization of the paper; these are the city, news, telegraph, sporting and sometimes dramatic, cable, society, and other editors.

Below these are the copy readers and reporters. It is the duty of the reporters to gather the news. In most papers this is done on assignments given out by the editor in charge of the department in which the reporter works. On the larger papers there are usually regular "runs," such as police, hospitals, hotels, courts, and other regular sources of news. Their copy is turned in to copy readers or rewrite men.

These are seldom heard of in stories of newspaper work, but they play a very important part. Each one knows the space that is allotted to him and under directions from his particular editor rewrites the copy to fill this space. There must always be a certain proportion of long and short stories with certain definite styles of heads arranged in as attractive a form as possible in accord with the style of the paper. He writes the heads and sub-heads, decides on minor matters of policy, watches out for libel or matter that may be contrary to the paper's policy. The space at his disposal is constantly shifting; it usually changes each day according to the amount of advertising which determines the number of pages that will be issued. It then changes constantly as the news comes in, according to the importance of the various



*stories. He usually works from a "dummy" for the day, showing what space still remains to be filled. The editors determine the general make-up of the paper, what news shall be "played up" or given prominent position, and in general, exercise supervision over the work of the copy readers and reporters.*

#### **47. A reporter's work**

The qualifications for newspaper work are good health, good digestion, and endurance on the physical side. There is a common saying that, "A reporter is as good as his legs;" meaning that when he can no longer undertake the strenuous work of news gathering, he is laid aside. His hours are long and extremely irregular. He must follow a story through regardless of overtime, and yet must keep in touch with the office so as to deliver all news as long before the "dead line" or closing time for the day as possible. He needs a remarkable fund of general information. There is nothing foreign to his work. The more he knows of economics, politics, history, and especially of the personalities and news events within his particular field, the more valuable he is. Above all else he must have that peculiar thing which newspaper men call a "nose for news," which means that he must be able to select the unusual, the striking, and the peculiar from the endless mass of commonplaces that happen all about him. He must, of course, have the ability to write, although this is not always the first consideration. A city editor is generally willing to "whip his style into shape," if he possesses the other necessary qualifications.

The newspaper demands a clear concise style, telling the story so that its striking points or "high lights" are instantly visible to the most casual reader. It is an almost universal rule that the first sentence should "tell the story."

*There are several reasons for this. In the first place, it has been found by experience that this form is the one that attracts and holds the attention. In the second place, it enables the head writer to work quickly. Third, it makes it possible for the editor to decide at a glance upon the value of the story. Fourth, and most important of all from the view of the practical make-up of a newspaper, in a story so written each paragraph makes a logical conclusion. This gives an opportunity for the copy reader, or make-up man, to cut the story without injuring its news value by the simple process of dropping off paragraphs.*

#### **48. Quick and accurate judgment necessary**

Another fundamental qualification is a quick, accurate judgment. The reporter who cannot almost instantly select the salient points and reject the dangerous or undesirable ones in any situation stands little chance for promotion; while the editor who lacks this qualification will soon ruin himself and the newspaper. Nearly every day editors are called upon to make judgments within a few minutes, and often within less than one minute, that may make or break their publication. If they pass libelous material or miss seeing the big story in an apparently insignificant item a few times, they lose their value to the paper and usually their position.

There are almost countless doors of entrance to journalism. In the early days, many came in through the composing room. The old editor was often able to set up his own copy; and until very recently this was true of a large percentage of the editors of the smaller weeklies and dailies. These small-town and suburban local papers still offer a common method of entrance to the would-be

journalist. There an all-round experience can be obtained, which was once considered of greatest value in newspaper work. But today the more common method of entrance is as a reporter on a large or small daily. For this a high school education is now practically required; indeed, few of the larger papers will hire a green or "cub" reporter, as he is commonly called, without a college education. With the growth of the schools of journalism that are now to be found in more than twenty universities, many papers are demanding graduation from such institutions.

Another method of entrance is that of space writing. This simply consists in sending in stories to the newspaper on the chance that they will be printed and paid for according to the space occupied. This is perhaps the best test for anyone who now has another job. There are stories all around everyone that newspapers would like. The beginner who will write and especially rewrite the stories that he sees, according to the style of the paper to which he hopes to sell them, is getting a very good training in journalism. He can add to this by a study of the many good books that have recently been published as textbooks for schools of journalism. Incidentally, the very best recommendation for a job is to bring a good story to the managing editor; and it is almost the only sure way to get an interview in applying for a job.

#### **49. Wages and promotion**

Wages reflect the variety of the work. Many a reporter on a country newspaper receives only \$5 or \$10 a week; and wages run all the way from this to the \$50,000 or \$75,000 a year that are paid to a few great editorial writers. These latter salaries, however, are

usually given only to those who combine business ability with that of writing.

There is no regular line of promotion. Theoretically, there is an advance from reporter to copy reader, to editor, to managing editor. Where this line is really followed, promotion is generally rapid because of the extremely high turnover in nearly all newspaper offices. Many newspapers follow the plan of hiring a large number of new men and keeping them as long as they can furnish new ideas. Moreover, those who enter the occupation are often of a wandering type little inclined to hold permanent positions. Many reporters, however, do not consider a "desk job," such as copy reader or editor, as a promotion. It is possible for a reporter to rise, as his powers develop, to a "star man," special feature writer, or foreign correspondent, who may command as high wages as are paid to the average editor. Indeed, the men who served as correspondents at the front in the Great War, or who cover great affairs, like the Peace Conference or the Disarmament Conference, or who represent papers at national capitals, are often considered at the top of their profession. They are usually permitted to sign their articles and to make use of some editorial privileges in the expression of opinion, something strictly forbidden to the average reporter. Such men have many opportunities to write for magazines and to enter other fields of journalism. A large proportion of the popular novelists served their apprenticeship at the writing trade as reporters.

#### **50. Working for news agencies**

Another field of opportunity for the journalist is offered by the great news agencies. There are three of

these in the United States: The Associated, United and International Press Service. These have their representatives all over the world and have many semi-editorial positions at their headquarters.

Another field for those who prefer what is called "feature writing" or the preparation of special articles on matters not of immediate news interest is furnished by several great syndicates. These supply material to very many newspapers.

Still another opportunity open to the person who has learned the trade of journalism and accumulated some capital is to become a publisher of a small-town or suburban paper. Such a publication, if the locality is carefully selected and the paper well managed, offers a fairly profitable livelihood.

In every field concerned with journalism, the foundation of success in man or woman (for this is a field in which the sex line is rapidly fading away) is to "know a story" and to write it clearly and simply and go after it regardless of trouble, work, and discomfort.

### **51. The business side**

The publication of a newspaper is also a great business enterprise, very often with millions of capital invested. Here is a field as yet little studied or systematized. It is entered, much as are other businesses, by securing positions on one of the lower levels in the circulation, advertising, or administration side. The chance of promotion to the highly paid positions of circulation, advertising, or general business manager, for a person who really studies business management as applied to newspapers, is good.

Recent years have seen a remarkable development of technical and business publications, which are also

affording splendid opportunities to persons who can combine a knowledge of these special fields with a mastery of the trade of journalism.

Another opening that is growing constantly in importance is in the conduct of house organs. Thousands of businesses now operate these papers; and the business of conducting them is rapidly becoming a special profession, calling for a knowledge not only of journalism, both on its editorial and business side, but of business management, and especially of the personnel side of industry.

The great growth of monthly and weekly fiction and general informative periodicals in recent years offers another line of promotion to the man or woman with journalistic training.

Finally, there is the field of the independent or "freelance" writer who sells his copy wherever he can find a market. This field is greatly overcrowded, but nowhere is it more true than here that there is always room at the top. The person who wishes to enter this field should secure all the education possible, and then prepare to go through a long "starving time," during which, if he is made of the right stuff, he will be educated by the large number of rejections that he will receive. Every article rejected should be carefully studied to determine the reason for its unavailability. Everything written should be prepared for some definite publication which should be thoroughly studied to see whether it is using material of the sort which the writer has to offer. Time spent in a library studying various publications will not be wasted by the young writer. While authorship has a strange fascination, that fascination has attracted many more than the demand justifies; and nowhere is the demand more exacting, the prizes fewer, the upward struggle slower and harder.

## **Dentistry**

### **52. Fame of American dentistry**

This profession is growing by leaps and bounds. It is pre-eminently an American profession. In the great scientific centers of Europe where other professional men boast of their home training, one sees the sign "American Dentist," a recognition of the fact that the best trained dentists of the world come from the United States. As the importance of the care of the teeth and its relation to the general health is becoming more and more to be recognized, this profession is increasing in importance.

Dentistry to a large extent is a mechanical trade, subject to the same possibilities of invention as are to be found in any similar field.

Schools and social welfare organizations of all kinds are laying greater emphasis yearly upon the care of the teeth, and giving greater opportunity to dentists for public service. The recognition by employers that the condition of the teeth of their workers is closely related to their general welfare has led to the development of industrial dentistry. A large number of firms today employ dentists on whole or part time to care for the teeth of the workers.

As the knowledge of the profession increases, so naturally must the standards of education required for admittance rise. A few years ago almost anyone could practice dentistry. Today the qualifications are fixed by law in nearly every state. In most places a high school education, plus two or more years in college, is required for admission to the profession. But this is only the beginning. So rapidly is the profession growing that the dentist who is to keep abreast of the procession must give a large

portion of his time to study. He must keep up with current literature, both periodical and book, attend clinics, and belong to professional associations.

Such promotion as takes place is not often from one position to another, although a great many dentists begin work as an assistant and serve a few years on salary before opening their own office. Promotion comes from gaining the favor of the public through excellence of work and personal relations.

There are also fields for specialization. One form of this is dental mechanics. The work of a dental mechanic consists in making art dentures and restorations, such as plates, bridges, crowns, inlays, etc., according to specifications and directions received from the dentist. This is a work which may be entered by anyone possessing mechanical skill and training. It is not necessary first to become a dentist. The wages are given by the Federal Board of Vocational Education as "from \$15 to \$40 or \$50 a week, depending entirely upon the ability of the mechanic, his speed and careful workmanship being the determining factor."

Other fields of specialization are the extracting of teeth and the use of the X ray.



## **Optometry**

### **53. Does not deal with disease**

The optometrist writes prescriptions for glasses after an examination for visual or muscular defects. He does not treat diseases of the eye either with medicine or surgery. He must be distinguished from the oculist, who is a specialized doctor dealing not only with the measuring and fitting of glasses, but also with all pathological or diseased conditions of the eye. He must be distinguished, on the other hand, from the optician who performs the mechanical work of grinding the lenses and fitting them for use according to the prescriptions of the oculist or the optometrist.

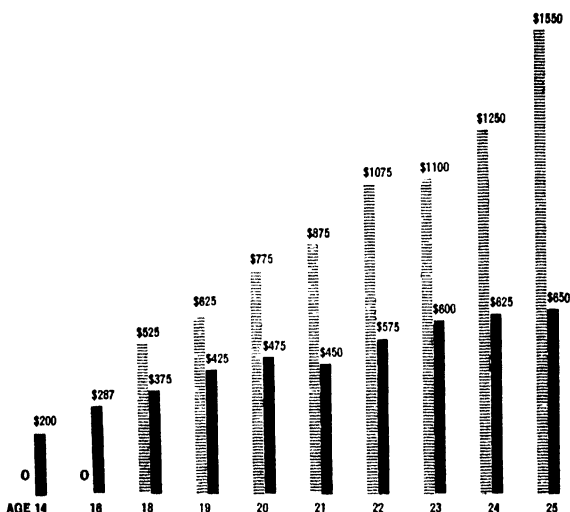
Because of the limited field of the occupation, the optometrist requires less time for preparation than the physician or oculist. Nevertheless his work is so important that the qualifications are determined by law in forty-one states, most of which require a general education equivalent to at least two years of high school instruction and the completion of a course in a school of optometry having an approved two-year course, in addition to one year of practical service in an optometrist's office. In many states an examination is required after all this prescribed schooling has been taken.

Owing to the greatly increased attention being given to the subject of defective vision, especially in school and industry, there is a good demand for optometrists. It is generally possible for a graduate to obtain a position at once as an assistant in an established office. After practicing here for some time, he can either set up for himself or look forward to promotion within the firm.

Because the worker deals with refraction of light and the making of lenses, considerable advanced mathematics including trigonometry are necessary as a foundation of the work. In addition the following subjects are included in one of the standard courses given by a leading university on the subject: chemistry, anatomy, physics, physiology, bacteriology, optics, psychology, drawing, pathology, and English composition.

The Federal Board for Vocational Education says concerning the opportunities in the course: "As in other professions, it usually requires a few years to build up a practice, but few men who have started under proper conditions and with fair qualifications have failed to achieve success. An income of \$1,500 or \$2,000 yearly is common, and many optometrists earn incomes of from \$5,000 to \$10,000. As an employe of another optometrist, a practitioner can earn from \$30 to \$50 a week, and even more."

## What Industrial Education Paid 215 Boys



The solid black columns represent the average yearly wage received by 584 children who left school at 14 years of age.

The hatched columns represent the average wage received by 215 boys who remained in technical schools till eighteen years of age.

**Note that the Technical School Students surpass the shop-trained boys from the beginning, and at 25 years of age are receiving \$900 per year higher salary.**

## CHAPTER IV

### Engineering

#### 54. Creative work demanded

There is no direct line of connection between the ordinary skilled trades and such professions as physician, lawyer, dentist, and teacher. The engineer, on the other hand, is connected with the manual trades and works with and through them. Yet the professions of civil, mechanical, electrical, and structural engineer mark a long step above the crafts of machinist, electrician, carpenter, mason, and similar trades. These latter are concerned with manipulative skill, with the ability to make things as they have always been made or as others plan them with slight variations. Such skill is gained by practicing—by doing the same thing over and over again. From this group to the engineering professions is a long leap bridged, however, by many links.

It is the function of members of the engineering profession to add the creative step; it is theirs to do the planning, the designing, the directing, and the far-seeing prophetic portion of the work. They stand upon racial experience, principles, and standards. They must know these things and follow them, but not to copy. They must use them as a foundation on which to build. Their function is to add something to what has been done. This is the most valuable work the race assigns to any class. Those who have the power to perform it can demand their own reward and honor, and it will be gladly paid them by a grateful world.

### **55. The engineering language**

One of the links that connect the trades to the engineering professions is that common language of the craftsman and the engineer—drafting. This is a universal tongue spoken by all artists and craftsmen who work in the material of which things are built. It is a means of communication—of expressing ideas in tangible form that shall be understood by those who are to carry out the ideas. It is the form in which most creative thought in these fields first finds shape. It is the universal means of conveying the design from the head of the artist to the worker who is to embody it in metal, stone, or other material.

The most common words and phrases of this universal language make up mechanical drafting. This is then specialized by the addition of new terms for the work of the architect, the civil, ship, and other engineers.

### **56. Trade of draftsman**

The draftsman who knows **only** the language may, like a translator, be only an interpreter—an intermediary between those who think the thoughts he is to transfer. At the same time the trade of draftsman offers an introduction to the engineering professions and a valuable supplement to all the constructive trades. The machinist, carpenter, sheet-metal or structural ironworker who knows drafting has brought himself one link closer to the professional side of his craft and has opened new opportunities. The person who has only the trade of draftsman can find valuable openings in any one of the engineering professions as an assistant. His work will be to copy and develop the ideas of the engineer. He

will need some knowledge of mathematics, much manipulative skill, and will have an opportunity to study and train himself for the engineering profession to which he is attached. Even the commercial employe needs to know this new language of drafting, as more and more the facts about business are presented in the form of graphs and diagrams, to make or read which calls for at least a partial knowledge of drafting.

The next step toward the profession is learning the oldest of all universal languages—that of mathematics. By its use the Egyptians laid out the pyramids and the Greeks their temples, and the valleys of the Euphrates and Tigris were irrigated. If he does not know this language, the engineer cannot think the thoughts of his profession. He must know geometry that deals with lines, angles, surfaces, and solids, and the relation of each of these to all the others. He must know algebra with its power to substitute symbols for things unknown and then work with merciless logic until these symbols turn into measurable facts. If he is to reach the highest points in his profession, he must be able to speak the language of calculus with which, alone, he can think in terms of some of the stresses that must be calculated in building great structures. These things are keys that open great storehouses of race experience and their knowledge is the common foundation of all engineering occupations.

## **57. Engineering at foundation of civilization**

When you look upon the achievements of civilization, you look upon the work of engineers. The great architect, Sir Christopher Wren, is buried in St. Paul's cathedral, which he designed. Above his grave the visitor reads, "Do you seek his monument, look around you."

So the engineers of the past might say, "Do you seek our monuments, look upon civilization."

The engineer plans ahead of the present stage of society, sees the vision, and makes it real. He has spanned the rivers with bridges and curbed the cataracts with his tubes and turbines. He has barred the way of torrents, and with the once wasted water has irrigated desert places. He has bound the continents with the steel bands of railroads, and tamed the seas with the palatial ferries that shuttle back and forth along the steamship lines. He has made the mountain lakes run from city faucets, and transformed the waste of metropolises from a deadly menace into a source of wealth and life. He has united the oceans by means of the Suez and Panama canals, and joined the minds of distant peoples by means of the submarine cables and the wireless. He has reached into the tropics and curbed age-long scourges and transformed plague spots into beautiful playgrounds. Only by the miracles of the engineer does modern civilization exist. When civilization threatened suicide, the engineers helped to fight the Great War, and when civilization is struggling back, the engineers are restoring the devastations of war.

Opportunities in such a profession are as boundless as its achievements. There is no limit save his own abilities to the height that an engineer may attain. Such a profession has high qualifications. The world does not give its greatest rewards without experience and consideration. It is not surprising, therefore, that when mental tests measured the intellectual capacity of the men in the national army, the engineering profession led all others in every camp. Those who had succeeded in that profession showed a greater mental capacity than even lawyers, teachers, and others of the so-called learned professions.

### **Architectural Engineers**

#### **58. Architects design them all**

Practically all modern buildings must be planned by an architect. In some of the larger cities no building can be erected without his O. K. Cities have become too complex to trust to the unguided skill of individuals in erecting buildings that must fit into the whole city life. Modern buildings in a large city are united to one another in a host of intimate ways. They are served by the same transportation often in several forms; they have common systems of heat, light, power, water, etc. No one can build a structure by himself any more than he can live to himself in modern society.

Every section of a great building is carefully planned in advance, and its details drawn for the instruction of those who are to do the work. So diverse are the structures required by the present civilization that the work of an architect divides itself largely according to the building in which he specializes.

He may be a designer of homes, and these vary from the simplest cottage or bungalow to the palaces that are now more numerous and more costly in America than they ever were in Europe. Great cities call for peculiar types of structure. The modern apartment house that shelters sometimes more than a hundred families must be built so as to provide standard accommodations, comforts, and even luxuries suitable to the tastes of many different people. The mammoth hotels that are housing a larger and larger portion of our population each year make still greater demands upon the skill of the architect. The towering skyscraper office building is peculiar to America and is one of the triumphs of American



architects. The ever-increasing multitude of conveniences that are a part of every such building tax the ingenuity of the architect as perhaps no other problem of construction. Department stores and manufacturing plants with their peculiar problems of light, heat, power, and economy in the operations that must be carried on within them are making new demands on the architectural profession. The great warehouses, storage plants, depots, public buildings, and other specialized structures each present their own peculiar problems.

### **59. Combining utility and beauty**

Architects usually specialize in some one of these various fields. Whichever may be selected, one problem is always present. This is the combination of utility and beauty. As Ruskin and a long line of writers following him have shown, the highest degree of either one of these is usually combined with the highest quality of the other. American architects have been inclined to neglect the artistic side. Recently, there has been a decided change in this respect. As good taste becomes more common, the demand for beauty is certain to increase. This is one quality in which perfection can never be reached, and which brings the highest rewards. A generation ago the architects who designed American homes produced horrors that made us the laughing stock of the artists of the world. Today, international architects agree that America leads in comfortable, artistic homes.

A somewhat similar evolution has taken place in office buildings. The first ones built were universally denounced as hideous blots, destroying all possibility of beauty in the modern cities. Today, such buildings as the Metropolitan Tower, the Woolworth, and the Wrig-

ley skyscrapers are recognized by artists everywhere as being of supreme beauty. Indeed, it is just in this new field, once looked upon as presenting insoluble artistic problems, that American architects are making their greatest triumph. This is one more illustration of the fact long recognized by artists, that difficulties are but opportunities, if rightfully used.

There is certain to be an increasing rate of building for many years to come, and it is also certain that the demands upon the architect will constantly increase. The time is probably not far distant when American cities will follow the example of Paris and some other European cities, and make beauty one of the conditions of approval in the plans for a new building.

#### **60. Many things architects must know**

Nowhere else in the world are the demands upon the knowledge of an architect growing so fast as in America; nowhere else are there so many improvements in buildings. The modern architect must know something of many crafts. He must frequently, especially in the smaller places, act as contractor and sometimes as builder. He must, as a contractor, know costs of construction and prices of materials; as a craftsman he must know good workmanship in every branch of the building trades. He must have enough of the lawyer's knowledge to be sure that his plans comply with building regulations. He must, in short, draw his plans to fit utility, safety, legal regulations, costs, the abilities of the craftsman, the capacities of material, and all the time suit the ideas and resources of the owner. In the larger buildings it will be necessary for him to calculate strains and stresses as applied to a large variety of materials and

methods of joining them. This will call for some of the higher forms of mathematics. He must almost always supervise construction and pass on bids, and to that extent possess the knowledge required of the building foreman and the contractor.

The methods of entrance to the architect's profession are many. Nearly all great engineering schools give courses in architecture, usually as a branch of Civil Engineering. For admission to these colleges and universities a high school graduation is demanded. There are also many correspondence school courses offered in this profession. These open the way for a person who has already learned one of the building crafts. The young man who has served his apprenticeship as carpenter, mason, structural ironworker, or in other building trades, is in a position where he can, if he wishes, make the profession of architect his next step. He can start with considerable advantage over the high school boy who has gone directly to an engineering school. He usually knows something of drafting and is more or less familiar with the work of other building trades.

### **61. Paying the price of progress**

With this as a start, he can use his spare time to master the drafting and the necessary mathematics and be prepared to enter an architect's office. Here is where most men fail through lack of courage. They must, for a little time, work at lower wages than are paid in most of the building trades. The man who is not willing to make this sacrifice, in addition to the hard study that will be required of him, will not succeed in this profession. He must remember that while his building experience gives him some advantages over the man who

entered the architect's office as an assistant draftsman, he is, nevertheless, learning a new trade. His only advantage is that his apprenticeship will be shorter. He must accept the other conditions demanded of any learner. While working in the architect's office he can pursue his studies and be prepared within a few years to enter a very desirable profession. From then on his promotion depends upon himself.

He must keep abreast of every new phase of building construction, learn all the latest developments in plumbing, light, heat, power, ventilation, and fire proofing, as well as in artistic design, the world over. He must study building laws, underwriter's requirements, and how to suit all these things to the wishes of the owner for whom he works. He may then specialize in any of the fields of architectural work that have already been described. His rewards will vary from a mere living to a princely income according to his ability and willingness to work.

## **62. Through the drafting room**

Most architects enter the profession directly through the drafting room, where the learner begins as a tracer and advances to draftsman while studying the principles of architecture. For the young man who can take training by correspondence or otherwise in his leisure time, this affords the most satisfactory line of entrance. He should, however, seize every opportunity to secure actual skill at as many as possible of the building trades.

## **Civil Engineer**

### **63. A desirable profession**

The civil engineer holds the basic position in the engineering profession. His work was the first to be developed into a profession, and in many ways the work of the architect, and mechanical, structural, and other engineers is based upon the principles of civil engineering.

Wherever there is any great triumph of human effort over raw material, we will generally find that a civil engineer planned and directed the work. Cities like New York and Chicago exist because there are civil engineers. Without the Civil Engineering triumphs of the great aqueducts and reservoirs of the first named city, and the drainage canal of the second, neither New York nor Chicago could exist on their present scale. Without the civil engineer to plan transportation and communication, no nation, covering such a territory as the United States with so diverse and complex institutions, could have arisen.

Judged by almost any standard, the profession of Civil Engineering is most desirable. The person who selects it can have the possible choice of working in great cities or he may live in the open on the outskirts of civilization. The work itself is constantly creative and always changing. Its social relations bring him among the most interesting people in the world. It is healthful in its surroundings and may be pursued through a long life. There is no section of the world that does not offer opportunities for the civil engineer. The profession calls for good health, and some phases of it demand physical strength and agility. It demands the highest mental type. If preparation is to be gained by preliminary education in a great engineering school, this calls for considerable finan-

cial capital. Income is as large as the ability of the engineer is able to make it. It will seldom be below \$3,000 to \$5,000 a year, and goes from that to the fabulous sums paid to those who combine great engineering and organization ability.

The civil engineer must know mathematics, at least through trigonometry. In most courses higher branches are required for a degree. He must be a thorough draftsman with special training in drawing and making maps. He should have considerable knowledge of geology. Many civil engineers obtain part of their training by spending a short period as assistants of some kind with the United States Geological Survey. He needs to know much of physics and something of chemistry, especially in their application to building and sanitation. He must know how to handle the transit and other surveying instruments.

When he knows all these, he will have little more than the language of his profession. He must then learn the materials used in engineering constructions. This means that he must know their strength and strain under compression in all their uses, and how to calculate their strength. He must know hydraulics, irrigation, and structural engineering, and with all these he will not reach near the limits of his profession unless he can meet business problems and calculate costs. A frequent cause of failure is lack of ability to manage men, for he must often deal with large bodies of men far from cities.

#### **64. Many ways to start**

There are many entrances to the Civil Engineering profession besides the technical university. A young man may obtain employment with a field party as a **chain-**

**man.** His work will be largely that of an ordinary laborer. He will clear the road for "running of lines," carry the chain, and do such other work as may be assigned him. He has the opportunity, however, of seeing the instruments of his future profession, and of studying the drafting and mathematics that he will need as he advances.

If he is ambitious and studious, he can expect rather rapid promotion to the position of **rodman** or **flagman** where he co-operates directly with the man using the transit, and where he will probably have opportunity to use his knowledge as draftsman and mathematician. From here the step is short to that of an **instrument man** or **surveyor**. He can then obtain a fairly good salary and, if he has no further ambition, can stay in this position for the remainder of his life. If he uses his ability to choose a higher profession, he can, by studying higher mathematics and other special engineering subjects, move on up to **assistant** and **chief engineer**. After serving in these positions through the prime of life, he can usually, if he has met the demands of his profession, retire to office work as a **consulting civil engineer**, where he can work to a much greater age than in many other professions.

If he prefers to enter through the drafting room, he will have a similar line of advance from **tracer**, where he will ink in the pencil drawings of skilled **draftsmen**, make blueprints, and, in general, do odd jobs around the drafting room, much as the chainman does in the field. Here he has constant opportunity to study and improve in drafting and mathematics. He advances to **detailer**, where he develops the sketches made by the engineer. From there progress leads on through **designer**, **chief draftsman**, **estimator** to **civil engineer** or **structural engineer**.

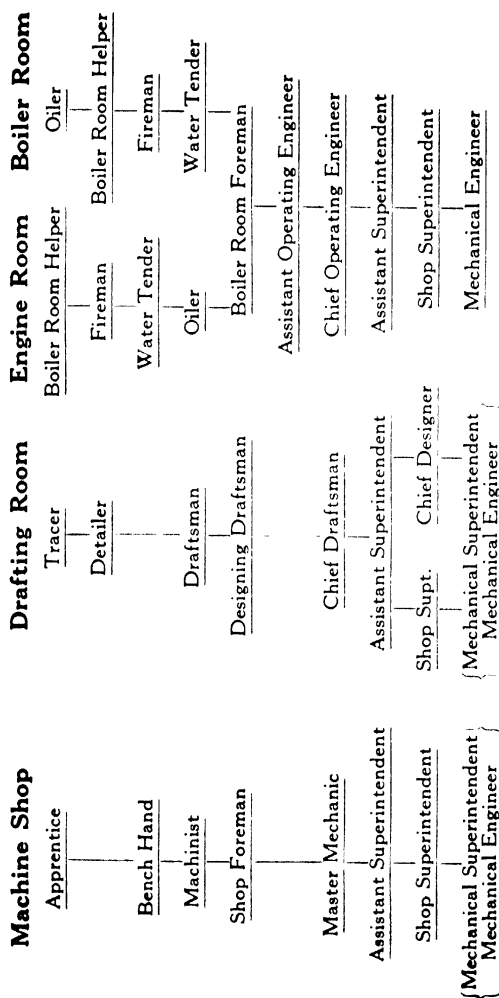
### 65. Up from foreman

The worker in a steel shop who has reached the position of shop foreman and mastered the drafting and mathematics which are usually required for that position is a long way on the road toward becoming a civil engineer. He has an educational and shop capital which, if he will increase by taking the additional educational training required, will enable him to reach the very desirable position of civil engineer with an effort much less painful than the pleasure which the additional power, more desirable work, and higher salary will afford. He may move out to the erection gang and rise through promotion to **superintendent of construction** and **construction engineer**.

There are sub-divisions of Civil Engineering, and some of these are more easily reached by one of the lines of promotion, already discussed, than the others; for instance, the **railroad engineer** is generally advanced through the surveying route. The position of **structural** or **construction engineer** is easily reached through one of the trades connected with building. The **municipal engineer** also comes naturally by way of the building trades; it is his business to construct and care for the water supply and sewage, to lay out and supervise the construction of streets, parks, and other municipal undertakings. Still another field is that of Reclamation Engineering; the **reclamation engineer** builds the great dams and lays out the systems of canals that irrigate the desert, or devises systems of drainage that make pestilential breeding marshes into fertile farms. He also deals with the location of power plants, the building of levees to restrain the overflow of rivers, and similar works.



## Mechanical and Steam Engineering



NOTE: The diagram illustrates the more usual lines of promotion in this field.

## **Mechanical Engineer**

### **66. Furnishing ideas to manufacturers**

The mechanical engineer originates and organizes the ideas behind the great manufacturing industries. His is the task of locating the plants and determining by exact analysis the most profitable relations of raw material, labor, power, and markets. He then assists in designing the building and in locating the machines within the plant so that the process of production may be conducted in the most economical way. Mechanical engineers devise the wonderful systems of progressive assembly that make possible a steady flow of a product so complex as the modern automobile.

A mechanical engineer organizes the internal transportation of a plant, deciding where gravity, electricity, steam, or human strength is the most desirable power for moving materials, and which of the multitude of devices can use that power most economically. He has charge of many features that determine the health of the workers, such as heat, ventilation, light, etc. He must know how to locate and operate a power plant so as to secure the greatest amount of energy from the heat units contained in the fuel used. He deals with all the mechanical problems of a railroad. He must understand the designing of tools, jigs, and fixtures, and be able constantly to make minor and sometimes major inventions.

### **67. Should know laws of beauty**

More and more in such fields as automobile construction, he must be able to combine mechanical efficiency with artistic appearance. He must know mathematics, drafting, chemistry, and physics before he can enter upon

the study of the real principles of his profession, for these are the fundamental tools with which the engineer works. He must always know the principles underlying the problems he is called upon to solve. These principles he cannot learn from experience, because he is constantly touching the realm of creation; and experience, although it furnishes the foundation, can never furnish the examples for creative work.

He must be able to discover short cuts and to combine the ideas of many people. It is along these lines that mechanical engineers are now accomplishing such remarkable things in the elimination of waste in production.

There are many lines of promotion for this work. Some of these were explained when we talked of the machinist's trade, and those who wish to enter the trade by that road should turn to page 82, and read what is written there. He also can advance by way of the drafting room and the boiler room.

Every person occupied in any of these lines may look forward to choosing as the goal of his occupational progress the profession of mechanical engineer. To do this, he must begin early to devote his leisure time to the study of the branches that will be required when he reaches that goal, and which will also be the steps upon which he will tread in climbing to the desired position. For the mechanical engineer, as with all professions, it is impossible to give a scale of salaries, but they usually begin somewhere between \$3,000 and \$5,000 a year and rise to the highest sum paid to any employe.

## **Management Engineer**

### **68. Prescribing for sick business**

There is a branch of the profession of Mechanical Engineering which has grown rapidly within the last generation. This is known under such various names as Efficiency Expert, Management Engineer, Consulting Expert, etc. The work of this profession consists in analyzing industries to find their weak points and curing them. The person occupying such a position is a sort of consulting physician to sick businesses.

It has been demonstrated over and over again that modern business is seldom more than about twenty per cent efficient; that means that nearly eighty per cent of the energies—human, mechanical, and material—used in industry are wasted. It is the work of the management engineer to discover and eliminate these wastes.

His first step is to make a thorough analysis of the business, much as a doctor makes a diagnosis. He takes nothing for granted. He asks questions about everything that may, by any possible stretch of the imagination, bear upon the problem. He notes down carefully even the most immaterial replies. He has learned by a careful study of business relations, by long experience, by a comparison of the weaknesses of many industries, and by a knowledge of the engineering professions, just where to look for defects. When he has finished his analysis, he combines his material, draws his conclusions, and prescribes his remedy. This may deal with power, transportation, machinery, or any one of the multitude of methods of work—office management, motions used by workers, personnel relations of all kinds, location of the

factory, machinery, transportation of materials, form of organization, or any one of the hundreds of points that are brought out by the elaborate questionnaires often used for such analyses.

The management engineer does not necessarily know the business which he treats better than the owner or manager, but he brings a fresh point of view, a knowledge of many other businesses, a method of analysis, and a technique of organization that is peculiar to the profession. The person who wishes to prepare for this profession must cultivate the power of observation and independent decision. He must learn to take nothing for granted, to question everything, to think through his experiments in his own mind to the end before he applies them, and he must keep in touch through constant study with every development in the field of industry.

He can usually enter the profession by associating himself with some established firm of Management Engineers, where he will be sent out to make surveys and gather information to be worked over by the management engineer himself.

## Electrical Engineer

### 69. Trade vs. profession

Electricity is the miracle maker of the twentieth century that keeps the world marveling at its work. It takes on new tasks daily, never tires, and never lacks the capacity for additional work. So widespread has become the field for electrical application that a knowledge of the workings of electricity is desirable in almost every mechanical occupation and essential in a great number. There is no danger of this field being overcrowded. The opportunities are growing far more rapidly than the supply of skill and knowledge. Every day sees the centralized power-generating stations growing larger, the distance the current can be sent greater, and its uses more numerous. Already engineers are seeing in the application of wireless methods probable opportunities for the transmission of electricity over far greater distances and with far less expense. Any electrical engineer can name a hundred points on the horizon of electrical development where new fields are opening.

It is just this characteristic of rapid growth that makes intense the demand for men who really know all that has been discovered about electricity and who are able to go on from that knowledge to the as yet unexplored fields. There are plenty of electricians who know how to connect wires and to follow rule-of-thumb methods. But there is a great scarcity of those who, in addition to the **trade** of electrician, have a knowledge of even the necessary languages of Electrical Engineering—drafting, mathematics, and physics. Without this knowledge there is no possibility of taking that long step from the trade to the profession, nor can these things be learned by experience.

The handling of pliers, wires, push buttons, switches, and the other mechanical appliances used to convey electricity and set it at work will never give a knowledge of the principles that determine the flow and control of the mysterious fluid. The electrical engineer must not only know the fundamental things, but he must know how to apply them in a great number of situations. He must know the methods and the comparative economy under all conditions of generating electricity by coal, oil, gas, or water. He must know all the methods of transmission and transformation, and he must know at least several of the more important fields of the use of electricity.

#### **70. Physical requirements**

There are some places where a strong body and health are greatly needed, but they are not absolutely essential. The foremost electrical engineer of today, Dr. Charles Steinmetz, carries that marvelous brain of his, which earns him a salary equal to that of the President of the United States, upon a frail body. In a field where success depends so much upon new conquests there is need of that vivid but practical and controlled imagination which is at the foundation of creative work of all kinds. The person who chooses this field has almost unlimited choice of work, because electricity is now applied in nearly every department of industry. His income also, as in all these engineering fields, is simply the result of his achievements. If he is a competent electrical engineer, he will seldom be asked to work, even in the beginning, for much less than \$3,000 a year, and from that the sky is the limit."

In an occupation having such diverse duties, it is inevitable that there should be many lines of entrance.

There is the common one through the universities, demanding four years of expensive and hard study after high school. Many young men gain this education by their own efforts, earning their way with other work. There are some exceptional opportunities in this line, as the demand for electrical work during vacation is usually such as to insure fairly good wages. Graduation, the same as in any of the other engineering professions, carries with it the degree of Electrical Engineer.

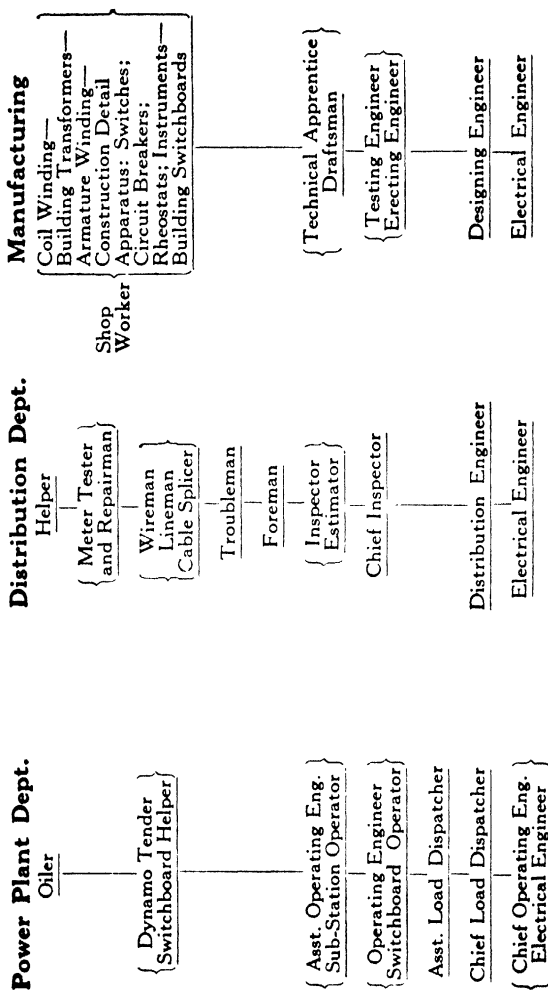
The large electrical companies, such as the General Electric, Western Electric, and Westinghouse, take many of the young graduate engineers each year and start them at comparatively low wages in their shops with prospects of rapid promotion when the technical side of the job has been learned. Such men must usually put in from one to three years at little more, and sometimes less, than the wages paid to a good machinist. They are sent from place to place throughout the plant to learn by experience the actual handling of shop problems.

#### **71. Coming up through the power station**

The worker at a central power station may begin as an **oiler** and proceed through the jobs of **dynamo tender** and **switchboard helper** to **assistant engineer** or even **sub-station operator** without very much outside study. By the time he reaches the latter position, however, he will find himself handicapped by his lack of basic knowledge of electricity. Progress from there to **electrical engineer** will depend upon his outside work. If, immediately upon entrance to the central station, he began the study of drafting, mathematics, and physics, he will have been promoted more rapidly, and by the time he has reached the point where he is in charge of a sub-station, he will



## Electrical Engineering and Manufacturing



NOTE: This diagram illustrates the more usual lines of promotion in this field.

be ready to complete the course of study for electrical engineer and to demand a position in that line.

If he enters in the field of power distribution, he may begin as a **meter tester** or **repairman**, and become a **wireman**, **lineman**, **cable splicer**, **troubleman**, etc., according to the work that is assigned him. In none of these jobs is there any fixed line of promotion. By the time, however, he has reached the position of troubleman, he should have obtained the fundamental knowledge already described, and, if he wishes to advance to **foreman**, the additional information concerning the handling of men required for that job. From now on he moves up to the position of **electrical inspector**, **chief inspector**, or **distribution engineer** only if he has taken a course in Electrical Engineering.

## 72. In the manufacturing line

Perhaps a more common line of development comes through the manufacture of electrical appliances. Here he starts in one of the great companies as a **shop worker**, **apprentice**, or **draftsman**, if he has had the necessary preliminary knowledge. Most of the big electrical companies are so thoroughly aware of the importance of technical training that they have classes which are open to their employees, thus making continuous promotion possible. This is one of the special advantages of this field of work, and should not be overlooked by the person entering it.

The worker who is ambitious to become an electrical engineer should make it a point to secure employment with a firm that offers opportunity for training. To this he can add correspondence work that will fit him for the highest positions. By the time he has learned the me-

chanical side of the trade, he is in exactly the same position, although having approached it from the opposite point, as the graduate electrical engineer who may have entered the plant at the same time with him. The graduate electrical engineer must spend almost as much time in getting experience as the shop-trained man, but the latter finds himself, if he hasn't studied, without the technical knowledge which from now on will enable the college-trained man to outstrip him. If the shop worker, however, has used the leisure time of his first few years in study, there should be little difference in the standing of the two classes of men at the close of four or five years.

Very many workers in electrical plants will not have made use of their leisure time to study, and will find themselves at the end of five or six years of work at an apparent dead wall. Here is the place to make a new choice, and the choice that will make most use of the existing capital of experience is that of electrical engineer. This will mean working evenings as well as days for some few years, but it will mean long years of easier, pleasanter work, and much greater opportunity for leisure in the future.

## **Telephone and Telegraph Engineers**

### **73. By wire and wireless**

The transmission of intelligence by wire has become a highly specialized field of Electrical Engineering. The apparatus used, particularly in Telephony, is changing rapidly and calls for continuous study. There is need for much knowledge of the principles of acoustics and the relation of sound waves to the electric current, with the methods of transforming one into the other.

Both of these fields offer opportunities for entrance into the profession of electrical engineer. The telephone industry, especially, reaches into almost every neighborhood and has many jobs in the lower, less-skilled lines of work. The person who starts as a lineman, or "trouble shooter," has an opportunity to learn the technical side of the profession. He will not advance far, however, unless he supplements this skill with study of the scientific and mathematical side of the profession.

The new developments in wireless transmission are opening a wide field of opportunity in a growing profession. The host of amateur wireless operators who are obtaining so much pleasure from their outfits can turn that pleasure into preparation for a profitable profession if they will supplement their experiments with thorough study of the fundamental principles of electricity.

## **Safety and Fire Protection Engineers**

### **74. Must foresee accidents**

This is a comparatively new profession based upon the recognition of the fact that there is really no such thing as an accident, if by that is meant something which occurs without cause or regularity. Statisticians can tell us almost exactly how many accidents of each kind will take place in the United States each year; moreover, they can tell what the causes will be.

The enactment of compensation laws in nearly every state in the Union has compelled a greater attention to the cause and possible prevention of accidents. These laws provide that the industry must carry the expense of the accident and are not concerned with the legal responsibility.

Experiment has shown that it is possible greatly to reduce accidents, and this is the work of the safety engineer. He has general charge of the safety measures within a plant. It is his business to locate and safeguard every point of danger. He must know just how and where accidents are apt to happen in relation to every item of equipment, every process of work, and all kinds of material used. He will find it necessary to master a very extensive literature upon the subject. When he has done this, he must then apply his knowledge of protective devices to the particular industry with which he is connected. This means frequent and minute surveys of every portion of the plant. It means recording every accident, investigating and, if possible, removing its cause.

When he begins this investigation, he will find that a large percentage of accidents are due to carelessness of the employee. But carelessness, like any other cause, can

be removed. The method of removal is by education and organization. He must know how to arouse interest in safety measures; how to make safety regulations self-enforcing; and how to instruct the workers in the use of all safety appliances and make them willing to use them. He must usually take a special course of study for this work after having already been trained in many phases of the industry where he is to act.

A frequent line of promotion to this profession is from shop foreman or from membership on a plant safety committee. Those who are in one of these positions and will fit themselves by a study of safety engineering will usually find opportunities either in the plant where they are now working or in some other plant in the industry.

The work of the fire protection engineer is usually not confined to one plant. He often serves in an advisory capacity to plants, but more frequently he is connected with insurance companies, fire underwriters' associations, or other firms directly interested in fire protection.

Both of these occupations pay from \$3,000 to \$5,000 a year in the beginning, according to the importance of the interests safeguarded.

### **Employment Manager**

#### **75. Efficiency depends on men**

The position of employment manager, or personnel director, or industrial relations engineer (as he is variously called) in industry is comparatively new. It came into existence because of the recognition, during war time, of the tremendous importance of the human element in industry. The managers of business suddenly awoke to the fact that the largest expense in production is usually for labor, and that it is the one product that is seldom standardized or bought on specifications. As industry grew in size, it had also become more difficult adequately to supervise labor, direct it, or to secure that personal cooperation which had been characteristic of the small industry. With increasing size there had come a tendency to substitute machine for man efficiency. If any sort of skill grew scarce or expensive, an effort was made to put the skill into the machine. Little attention was paid to whether the person running the machine was interested in his work or not.

We now know that efficiency in industry depends, as it always has depended, far more upon men than upon machines, and that it depends very largely upon the good will of the employee. There is no way to make a person do anything except to make him want to do it. To be sure, he may want to do it as an alternative to starvation or to some other painful experience. If he does work for such reasons, he will work poorly and will do no more than he can possibly help. This was the situation in industry until the time of the late War and still is the situation in a great many firms.

People who studied business management came to realize that one of the greatest wastes in industry could be stopped only by better personnel relations. The director of personnel in an industry is the man charged with the responsibility of adjusting all the human relations within the plant. He does all the hiring, and, in order to do this properly, he must know all the jobs for which men are to be hired. Manifestly, he cannot know these by experience as those who do them must know them. He must, therefore, know what is called "job analysis," or the method of systematic determining and arranging all the information about the job that will be of value for hiring or for any other human relation to the job.

To get, classify, and properly record such information, he needs to make, with the assistance of the foreman, a minute and careful analysis of just how each job in the industry is done and the exact qualifications demanded of the person who is to fill the job.

## **76. Interviewing applicants**

He must know how to interview applicants for work; and it has been found that this is a much more important trade than was formerly recognized. It involves the preparation of a set of questions that will bring out just the information wanted; that will test the employee's ability to fill the proposed job in every possible way. This may call for the preparation of both mental and job tests. The employment manager must also keep records of all the persons in the plant, and this involves the preparation of blanks and reports in an efficient manner. He must work out a method for introducing a new employee to his job with as little waste of time and energy



as possible and in such a manner that the new worker will be a satisfied, efficient producer from the start.

It is his business to see that the number of persons hired and leaving the plant is no larger than necessary. This means he must keep down labor turnover. Every person leaving the plant takes away with him something of value in the form of experience he has gained while there; and every person hired means an expense for training until he has the experience that makes him an effective worker. The person having charge of personnel relations should pass finally upon all discharges. He must know the reasons that make discharge necessary and must seek to obviate these as far as possible.

He should be able at any time to know the exact capacity of every man in the plant. This means the establishment and maintenance of some sort of a rating system by which the ability of the worker is recorded from month to month. It is his task to work out promotion plans of such a kind that every person who enters the plant can see before him opportunity for growth and know under just what conditions promotion is possible. He generally will have charge of training and plant education. Many firms have elaborate systems of welfare, involving clubs, societies, insurance, and many other activities. The technique of installing and operating these has become a trade in itself, which the director of personnel must know. He must be able, by consulting his records of job analysis, to know just what training is necessary to fit any worker who may be hired into the job for which he is intended, or which may be required to promote any worker to the job above him.

## **77. The job that he must fill**

The qualifications of an industrial relations executive are described as follows in "Management Engineering" for December, 1921, by Edward S. Cowdrick, Assistant to the Vice-President, the Colorado Fuel and Iron Company:

Among the natural qualifications of the industrial relations engineer first rank should perhaps be given to love of humanity. The man who does not love his fellow men, who does not sympathize with them in their struggles and their aspirations, has no place in the field of industrial relations, however impressive may be his attainments or however profound his knowledge.

Of almost equal importance is understanding of human nature. Industrial relations depend upon the actions of human beings under varied sets of conditions. It is essential that the leader in these activities be able to judge with accuracy what will be these reactions.

But a man may love humanity and understand human nature and still be unfitted for the profession unless he combines with these attributes a sense of justice so nearly unerring that it may be said to be instinctive. Justice is the cornerstone of all right relationships between employer and employee. The man who moulds these relationships should be one whose bent toward justice is like the inclination of the compass needle toward the north—instant and unswerving. He should have the ability and the courage to follow the path of fairness through the thickets of prejudice and self-interest with which it is often obscured.

The human engineer also has need of a personality and a character which will inspire confidence on the part of the management and of the employees. The most constructive ideas are well-nigh useless without the ability to "put them over."

The industrial relations executive should have faith. He should have confidence in the ultimate victory of justice and fair play. He should have a resilient optimism that inspires him to persevere in spite of the numerous discouragements and reverses with which his path is certain to be beset.

Assuming the possession of these fundamental qualifications, what is the training through which the engineer of human relationships should pass?

Undoubtedly as broad a knowledge as possible of industry in general and of the business of his own organization in particular is desirable. The personnel man needs to be unceasingly a student—a student of all the elements entering into the endlessly complicated thing we call business.

This knowledge of the world's affairs should be co-ordinated with a wide experience in dealing with men. This experience may have been acquired in the workshop, in the office, or in the pulpit. It is the thing itself, not the method of its acquirement, that counts.

### **78. Present prospects**

This work is one that had a very rapid and somewhat unnatural growth during the World War. When the financial depression followed, some firms abolished such work or greatly reduced its scope. This reaction was due in no small degree to the fact that the sudden demand for men in this profession caused people to rush into it from other occupations without training. Such persons did not rise to the full opportunities of the profession; they made many mistakes, which often led to their own discharge and the abolition of the department. On the other hand, those who had really trained themselves for the position, and who were able to do the work effectively, were easily able to show that the economies connected with their work were far greater than the cost of the department. Those firms with a really efficient personnel department did not discuss its abolition.

There is no doubt but that this field will grow rapidly in the future, but it is going to demand highly trained men and women to fill the positions.

As the profession grows, it follows the course of every other profession in that the training needed cannot be obtained by experience alone. The amount of knowledge

now available for training purposes is far greater than any person can obtain by individual experience. The whole purpose of education and the reason for its existence is to transfer to an individual quickly the experience of many other people.

The material required for training has been organized in correspondence and resident courses, and any person now occupying a supervisory job, or who has done social work, can fit himself for this occupation by study. This is a field in which many women as well as men are working. Where there are a large number of women employees, it has been generally found that only a woman can satisfactorily fill the position.

## Training in Art and Industry

*This not only increases the quantity of products  
but enhances their value and the efficient use of the  
Nation's fast diminishing raw materials.*

Different Commodities	Value of Raw Material	Per Cent Skill Adds to Value
1 Pig Iron...	\$1 00	21
2 Steel .....	1 00	50
3 Forgings .....	1 00	100
4 Foundry....	1 00	120
5 Stoves.....	1 00	190
6 Tools .....	1 00	200
7 Cutlery.....	1 00	200
8 Pens .....	1 00	480
9 Cash Registers	1 00	500
1 Furniture .....	1 00	120
2 Carvings.....	1 00	125
3 Frames.....	1 00	140
4 Toys.....	1 00	150
1 Leather.....	1 00	33
2 Leather Goods	1 00	60
3 Gloves .....	1 00	65
1 Cotton Goods	1 00	60
2 Knit Cotton Goods	1 00	80
3 Printed Cotton Goods	1 00	125
1 Wool .....	1 00	50
2 Woollens .....	1 00	150
3 Clothing .....	1 00	500
1 Brick and Tile	1 00	300
2 Ceramics .....	1 00	290
3 Marble and Stone	1 00	200
1 Paper .....	1 00	50
2 Wall Paper	1 00	90
3 Printing.....	1 00	250
4 Engravings	1 00	450

The finer the skill in design and workmanship the greater the increase toward the highest market values.

N. B. The finer products have generally been imported!

## CHAPTER V

### Commerce

#### 79. Honesty the basis of trade

Commerce is a steadily expanding field. People keep adding to their list of wants as fast as the means of satisfying them are created. The laborer's family in our time has the world ransacked for his daily wants. This means an ever-widening field of work for those who collect things for sale.

The merchant's trade has gone through many changes. He was sometimes almost a social outcast—a peddler carrying his stock of fineries upon his back as he wandered from castle to castle in the days of chivalry. Sometimes he was a great merchant prince of Italy or the Hanse cities with ships on all the then known seas. Again he kept a stall at a fair in some crowded Oriental street or, later, the "general store" that was the local social center of many a little village in our own country.

Now he may be almost any of these, or any one of a hundred specialized divisions of the old trade of merchant. As the world has widened and the dependence of society upon the merchant has become greater, a new code of commercial ethics is gradually arising. For many, many centuries trader and trickster were almost synonymous, in spite of exceptions so conspicuous as to become forever famous. Such an exception was the "Merchant of Venice." Even the law of trading was *caveat emptor*—let the buyer beware—because trading was looked upon as a game where fraud and falsehood were the trump cards.

Slowly, through the centuries, the idea that mercantile gain came naturally through deceit and sharp practice has been dropping away. When advertising began to show its real power and the merchant realized the possibilities of simultaneous solicitation to millions of possible purchasers, few of whose faces he ever expected to see, it seemed an ideal opportunity for the practice of fraud and deception. Today, it is probable that the advertisements are more carefully scanned for error than any portion of the printed page. Experience demonstrated beyond dispute that truth in advertisements is the only thing that pays in the long run, and advertisers, as well as mercantile associations, have welcomed legislation punishing any misrepresentation.

Steadily the truth has grown to recognition that one of the biggest, most dependable, and useful assets that any merchant can have is the "good will" of a large body of persons. Such good will cannot be purchased or captured by fraud but must be earned by service. This lesson, that has taken the race several thousand years to learn, is the first one that every person intending to enter the field of merchandising should realize. Whatever may have been true in the past, success in merchandising today depends upon giving genuine service for value received.

This truth has taken form in what promises to be a proverb of the merchant trade: "The memory of quality stays long after price is forgotten."

The commercial field is easy to enter. It is open to both sexes. No great strength is required, only reasonably good health at the start. The really essential characteristics are possessed by a great number of people or can be cultivated. They are a care for details, neatness, a sense of order and responsibility, and accuracy.

### **80. Need of collective instinct**

There should be also a large development of what psychologists call the acquisitive or collecting instinct. The boy or girl who have never collected stamps, coins, or any of the other things that children delight to gather, is probably not fitted for a mercantile career. There is a development of this sense which is even more direct in its preparation for the work of a merchant. The boy or girl who is successful in and enjoys Red Cross and other campaigns, who manages the financial side of athletics, conducts a news route, loves to "play store," who trades, or buys and sells his many little possessions, will probably find a field of pleasure and profit in the work of merchandising.

Because it is easy to enter, this field is filled with half-educated persons. It is the place to which all graduates of a common school, or even a high school and a university, who have had no special training, tend to gravitate. Almost any of these can get a start in some of the lower positions and remain there until they or their employers become disgusted, and they secure new positions.

### **81. Beginning at the bottom**

Such are the jobs of **file clerk, cashier, sales clerk, checker** and **wrapper**, and similar semi-skilled positions. Just above these, and requiring more special training is the work of typist, calculating machine operator, stenographer, bookkeeper, and the like. The main value of such places is that they are preparatory to better things, and that they presuppose, at least, the minimum education necessary for further training. It is easy to give long lists of persons who have risen from every one of these positions to the highest places in industry. Retail stores, even



more than other industries, seek to fill higher positions by promotion.

The Federal Board for Vocational Education made a study of a great department store in which there were forty assistant buyers, of which thirty-one were women. "Twenty-eight of these women had been promoted from the elementary positions of cashier, stock marker, and office clerk. The average length of service required for this group to reach an average of \$30 a week is five years." Yet this same report found that the salaries paid for the lower positions are from \$8.50 to \$11 a week. This was the general wage level, and all such salaries have since risen somewhat. It is also true that for each one that was promoted, there were many more who either stayed in their original positions or joined the even larger number that roamed from job to job on this lowest level.

## 82. Lines of Promotion

There are many direct lines of promotion from such jobs. The **bookkeeper** can fit himself for an **accountant**;<sup>\*</sup> the stenographer with special training is on the road to a **secretaryship**, after which, promotion to almost any executive position is possible; the **calculating machine operator**, with training, may look forward to gaining the place of **department head**, or to using the position as a period of preparation that will make possible a leap into other lines.

When this level of sales clerk, bookkeeper, calculating machine operator, typist, and stenographer is reached, some use of leisure time is necessary to advancement. Nearly all of these, with the exception of sales clerk—and it is becoming true for this position also—calls for special training. Sometimes this is obtainable in evening classes or in preliminary courses in trade schools. The

<sup>\*</sup> See p. 121.

rate and extent of progress depends largely upon the use made of the time outside working hours, and promotion is along diverging lines according to the industry.

### 83. Diversity of field

In few fields is there greater diversity than in retail selling. Firms differ in size all the way from the corner grocery to the department store. Both offer opportunities, which often take the form of changes from one to the other. The beginner in a small store learns the elements of the whole field at the start and can generally find a position when he wishes in a larger establishment. If his start was in a small town, he may find it desirable to move to the city. The reverse is also true. Many leave their positions as employes in large establishments to open small businesses for themselves. Unless this step is preceded by a study of business management, accounting, methods of buying, handling, and delivering goods, it may not mean promotion but bankruptcy.

Stores may be classified in several other ways. One class confines itself to certain prices. Such are the familiar "five and ten cent stores." Others have some peculiar method of sale, such as the "serve yourself" plan. The numerous systems of "chain stores" have their own system of salesmanship and promotion.

When we classify according to the stock handled, the list is almost endless. There are grocery, jewelry, clothing, shoe, and many other kinds of stores. Many people once thought that all such special stores would be competed out of existence by the department stores. Experience, however, has shown that the small specialized store that gives service with its goods can prosper in spite of the competition of much larger establishments.

Such an industry naturally offers almost unlimited opportunities for promotion and choice. Lines of occupational choice run in several directions from nearly every position. These lines are of little value unless they are known and preparation made to take advantage of them.

#### **84. Salesmanship always first essential**

One thing is fundamental to advancement in almost every field of merchandising. The work of every person in a commercial firm affects sales. The business of the merchant always and all the time and everywhere is to sell goods. Therefore a knowledge of salesmanship is the basic qualification for every position. Lack of such knowledge is one of the main causes of failure in every stage and department of commercial work.

Salesmanship is becoming a science and an art. Its principles have been determined, reduced to writing, and can be learned by study. It was not always so. Until recent years salesmanship was looked upon as a gift, or something to be acquired only by rule-of-thumb methods through experience. Today, many institutions teach this trade, and students can take their choice between evening classes, trade and correspondence school work, or even college and university courses. Soon some such preparation will be a condition of employment in the most desirable stores.

#### **85. Training needed**

The Indianapolis Vocational Survey says: "Many efficient men and women are found in the stores, well acquainted with merchandise, store system and store practice, who have had little schooling; but invariably from executives came the idea that graduation from the school

of commerce or a recognized college is desirable for department store management, and high school and business training for those in selling positions." If executives who obtained their positions without such training are now demanding it of others, it is quite certain that such positions will soon be closed to the untrained. If training could not be obtained before entering the occupation, the present position should be used primarily as a means of support until the training is secured.

#### **86. What salesman must know**

The salesman must know the goods he has for sale. He must know their origin, methods of manufacture, standards, grades, styles, market contingencies, prices, extent of supply and the conditions of handling, storage, shipment, and most effective display. He must know the points which make consumers desire them. He must know consumers, because his work is to unite product and consumers; and he cannot make a good and mutually profitable connection when ignorant of either. So he must know psychology—the make-up of human minds. Salesmanship deals with minds. It consists in persuading people to buy what you have for sale—in making them want it—in helping them make up their minds. The salesman must know human desires and how they are aroused. He must know how to present goods, when to show them without comment, when to advertise, when to urge, when to advise and how to advise, and when to keep silent.

The person who knows these things has a multitude of choices of occupation pressing upon him in the mercantile field. None of these will do him any good if he is too blind to see them or unprepared to follow them. The

person who seeks promotion must pick his own path and follow it, using all the guidance and assistance he can command. There are systematic courses of study in salesmanship that shorten the time and cost of learning this essential foundation of a mercantile career.

### 87. Choose your field

Do you prefer retail selling over a counter with opportunities of promotion to **floor manager**, **superintendent**, and **general manager** or **buyer**? Would you rather be a traveling salesman, trusting to your own ability to fix your salary by commissions and looking forward to the position of **general sales manager**? Would you prefer to sell through advertising? Can you prepare circulars, advertisements for periodicals and posters, and make the most advantageous arrangements for the placing of publicity? Have you the artistic taste and skill to sell goods by attractive arrangements as a window dresser? For all of these positions there are systems of training that will hasten your progress. All such positions may be entered from almost any other position in a large store.

Choice of occupation in the mercantile field is not confined to changes within a single firm. The salesman may choose to start in business for himself, to change from a smaller to a larger firm or from a smaller to a larger city. He should not delude himself with the idea that he is choosing when he simply drifts, or that change always means advancement. Wandering aimlessly from job to job is permanent occupation of the blind alley job of drifting. Every choice should be conscious, planned, prepared for, and pushed to as great success as it permits. Choice should always be made in advance of change. The moment any job is entered, it should be carefully sur-

veyed and a line of progress within or without it planned. The person who does this is never unprepared for change. Should good luck bring some unforeseen advancement, he is not bound to follow his first choice. Should some unexpected obstacle arise, he can alter his plans. Under all conditions he is better off than the person without preparation.

### **88. Specialists in demand**

Within every large store there is continuous demand for salesmen who know special lines thoroughly. If the line in which you happen to be employed is the one you prefer, you are fortunate. If not, select the goods you would rather sell. The choice is infinite. Once made, back your choice to the limit. Get all the books you can find describing the goods. Read the periodicals that deal with your chosen field. Make notes on what you find. Classify your knowledge. Always focus it upon the idea of salesmanship. Study the class of people who buy such goods. Learn how they live and why and when and how they want the things in which you are interested. So few retail salesmen or saleswomen have ever made such a specialized study that the person who spends his evenings for one year in such a course of systematic study will find himself with a body of knowledge for which there is an urgent, unsatisfied demand. He can promote himself to any one of several desirable positions, if he knows the fundamental trade of salesmanship.

Some fields seem to offer peculiar opportunities in this direction. This may be only because they have been better developed, and there are even greater rewards in untouched lines. The salesman who specializes in infants' and children's wear, in clothes, shoes, or in any other

article of close personal use, and studies just how to give the best type of personal service along with the article sold will soon step out of the rank of a clerk into that of a professional adviser. Customers will gladly pay him for what he knows in addition to what he does, and this is the longest upward step away from the dead level of mediocrity in jobs.

### **89. Give personal service**

How many salesmen or saleswomen whom you have met knew enough of anatomy and hygiene and personal comfort in relation to these products to give advice worth having? How many know enough about matching the capacities and desires and appearance of the consumer to the price and quality of the goods to send every purchaser away better satisfied than if he had not had the assistance of the salesman? Those that you do know are not hunting for employers.

Turn to another field. The salesperson in a house-furnishing store who really knows the principles of interior decoration has, by virtue of acquiring that knowledge, added to himself the self-satisfaction and increased income of a second trade. He is independent of any employer. He has promoted himself. Yet the study necessary to master the additional trade can be completed in a short time by one who already has had experience in handling the materials, and there are many courses of instruction open in this line.

In every choice of a new field it is important that full use be made of existing capital. You would not think much of a merchant who decided to change from selling groceries to shoes, and who cleaned his shelves by dumping the food into the street. Yet every person has a large

amount of **personal capital**, consisting of **past experience** and **accumulated knowledge**. It may sometimes be impossible to make a desirable change without loss of much of this capital, but if the change is planned in advance and a position selected for the next step where the old knowledge and experience will count, much effort is saved.

#### 90. Build on what you have

It is better to seek promotion or a new choice of position by adding something to present knowledge preparatory to the expected and desired change. If you are selling goods over a counter and wish to advance to **floor superintendent**, you must build upon your knowledge of goods in your department by adding a knowledge of goods in the other departments on the floor. To this add the same sort of knowledge that is needed by a foreman—the knowledge of how to deal with human beings, both customers and sales force. If you seek the job of **auditor**—one of the most desirable and best paid—add a study of accounting and the principles of business management. If you aim at the much-coveted position of **buyer**, you can prepare by a study of the particular field of buying in which you hope to serve. The buyer must know markets, prices, styles, probable demand, and just how best to expend the money allotted to him to secure the most rapid turnover of the goods. A buyer often travels from market to market, sometimes makes frequent trips abroad, receives a salary from \$5,000 to \$25,000 a year, and usually finds his services in demand.



## **Traveling Salesman**

### **91. Marketing for big industries**

There are few more striking developments in industry than the growing importance of the salesman. This is specially shown in the development of a comparatively new type. This is the man, known as a drummer or as a commercial or traveling salesman, who visits individual customers and solicits their trade for some article or articles of merchandise or service. He may represent a great wholesale store, any form of manufacturing establishment, an insurance company, or he may sell books and household articles from door to door, or be the agent of an international firm traveling over the entire world. This field is an inevitable development of production on a large scale.

If a firm employing many persons is to run steadily at a profit, it must have a wide market for its goods. New customers must be continuously obtained and competition met over ever-widening circles. In a highly progressive society, like that of the present, new articles are constantly being invented. Naturally there are few customers for these articles because people do not know them. Before they can be produced on a large scale, the public must be educated to want them. This was the case with the automobile, with practically all modern office appliances, with the thousands of devices that make the work of the home easier, and with the many forms of insurance.

### **92. Salesman as an educator**

The work of the salesman is, therefore, largely educational. He opens an outlet for new things, ideas, goods, or services. He must arouse in customers new desires

and persuade them that the gratification of such desires offers greater pleasure than could be obtained by expenditures along old lines. Salesmanship of this kind is something more than order taking, assisted by a glad hand, a few funny stories, and a cigar, which characterized the methods of selling of a previous generation.

The new salesmanship is a science in so far as it is based upon a careful analysis of prospective markets, of goods to be sold, and of methods of selling them. It is a science whose principles have been reduced to writing and tested by experience. These principles apply in every field of salesmanship and should be mastered by anyone intending to enter any of these fields.

### **93. Conditions of success**

The salesman still needs the pleasing presence and good appearance that is fundamental in any business based upon personal relations. To this he must add the ability to meet the sharpest competition, to analyze markets and customers, to plan his work in great detail, to standardize every step of that work and to know when to deviate from those standards.

Every customer is solicited in a multitude of ways to purchase an endless variety of articles. He has but a limited income. How he distributes that income, beyond what he spends for bare necessities, depends very much upon the way in which the claims of goods are presented to him.

The salesman must know the customers' desires and capacities and just how to present his goods so as to meet these desires and capacities. In many cases he must do much traveling. A study of a large number of salesmen has shown that in a high percentage of cases they have in-

herited what psychologists call the nomadic or wandering instinct. A person who does not possess this at all, or in such a negative form that he dislikes constant change, is not apt to be a successful traveling salesman.

Because a business will share its profits more willingly with sales than with almost any department, and because no business can grow to great size without skillful salesmanship, the rewards in this field are large, but strictly proportioned to results. Whether working on a commission or on a salary, the work of a salesman admits of immediate and direct measurement. He will be rewarded according to the business he produces.

## **Insurance Salesmen**

### **94. Sharing social burdens**

Insurance is a means of anticipating and sharing the burdens of what were once thought to be great, unavoidable, individual calamities. The field of insurance naturally divides itself into two parts.

1. It is concerned with persons and covers insurance against death, sickness, accident, and similar personal misfortunes.

2. It is concerned with the protection of property against fire, shipwreck, hail, wind, burglary, and almost any conceivable destruction or misappropriation.

Insurance is a swiftly expanding field. It is reported that in 1921 Life Insurance Companies alone were carrying over forty-two billion dollars' worth of insurance. This does not include the immense sums carried by the United States Government for the discharged soldiers. Each year finds new phases of insurance developing and there is no reason to believe that this tendency will stop.

The most frequent opening in this field is that of **salesman**. The work of the insurance agent consists in locating, soliciting, and selling prospects for insurance. It is one of the most specialized fields of salesmanship, and one in which training has proved of so great value that most of the large insurance companies maintain institutions for the training of their salesmen.

A good education, pleasing personal appearance, patience, persistence, knowledge of psychology, and adaptability to many situations are among the qualifications of a successful insurance salesman.

The income depends almost entirely upon the success of the salesman in selling, as he usually works on a com-

mission. It varies from almost nothing to sums that rival the incomes from the best-paid professions.

The insurance companies are now so large as to maintain some of the most highly developed office systems of industry.

Advance through the office-work side of the industry is the same as that for any commercial or industrial office with one exception. The insurance companies have developed one occupation peculiar to them—the occupation of “actuary.” The actuary is a specialized statistician, capable of calculating the probable recurrence of all social phenomena.

The employe in a Life Insurance Company who seeks to become an actuary must master higher mathematics and must add to this close and specialized study of the methods used in constructing the actuary tables that are the basis of all insurance.

## **Real Estate Salesmen**

### **95. Buying and selling homes**

This is another specialized form of salesmanship. It has many features that differentiate it from other lines. In the first place, the salesman, especially if he is working for himself, must secure the goods he is to sell by soliciting owners for the privilege of acting as their agent. When he has done this, he must use all the methods of good salesmanship in disposing of the property.

Like every good salesman, he must know his goods, and this, in his case, means a rather broad education. He must have a legal knowledge of deeds, mortgages, leases, and other forms dealing with real estate. Because of the importance of this knowledge, this profession is often entered by lawyers who have not been successful in legal practice. He will find a considerable knowledge of architecture and methods of building of value.

Perhaps of most fundamental importance for his business success is a knowledge of the field of economics that deals with real-estate values. He must study the movements of population and industry that he may know in which localities real estate is rising and falling. Without a knowledge of transportation, markets, and probable industrial development, he will find himself constantly loaded up with dead stock, or, if he invests his own money, facing heavy losses. Much of his work will require close association with banks, and he will need to know the conditions governing loans and the various forms of contracts and payments.

In the larger cities, the occupation is usually specialized according to the commodity handled. One real estate firm will deal principally in residences, another in factories,

office buildings, or vacant land. An important and, if successful, highly lucrative phase of real estate business consists in developing the suburbs. The real estate firm secures the backing of some bank, trust company, or other organization with funds and purchases unimproved lands. This is then subdivided into lots. If this is wisely done, it will call for the assistance or the knowledge of the landscape gardener. Often these lots are sold directly and the transaction closed. In other cases houses are built, and these are sold often on long-time contracts with partial payments. Any such transaction calls for wisdom in foreseeing city development and ability to do many things that ordinarily belong in the field of banking or law, in addition to capable salesmanship.

Entrance to the profession is usually by association with an established real estate firm, either in the office or as salesman. Promotion comes with success in the handling of problems such as have been discussed, and this success depends upon accurate knowledge so guiding a vivid imagination as to control that imagination and change it to shrewd foresight.

## **CHAPTER VI**

### **Accounting**

#### **96. Bookkeepers' opportunities**

Bookkeeping is the lowest semi-skilled profession in a line of promotion, the top step of which is certified public accountant. Bookkeepers follow precedent, work according to prescribed rules, do the same things over and over, and have therefore become the classical illustration of hopeless stagnation.

Bookkeeping is confined largely to recording the money received, spent, and due on work already done and in connection with transactions already completed. It is a perpetual burying of a dead past. It is one of the essential "chores" of business which must be done, but which, if accepted, finally becomes a life sentence to hard, disagreeable labor. There is no reason why it should be so accepted. It may be made a valuable step to better things. If it is so used, it loses much of its disagreeable character and becomes but necessary training for higher positions.

Few bookkeepers have any idea of the full meaning and the many calculations which can be made from the figures they handle. They perform only the simple operations required to keep their books in a certain order. They do not reason back to the causes behind the figures with which they deal, nor forward to results.

#### **97. Work of the auditor**

Every business needs a periodical examination of its accounts with at the very least a review of the methods



used, a checking of errors, a summary of results, and drawing of conclusions based upon a summary of all facts. Those who do this work are known as auditors, or, if on a trifle higher stage, as accountants. If the work is confined to the supervision of the bookkeeper's work and a further analysis of what he has done, it is usually called auditing.

While there is no sharp distinction between the two positions, the name **auditor** is usually applied to a person who possesses less than the skill required for a full-fledged accountant. An auditor's work is more interesting, requires additional preparation, carries more social and business prestige, and commands a much higher salary than that of a bookkeeper. He is usually called in for special investigations when there is a change of business, a new method of financing, or any suspicion of irregularity. He must be able to analyze the operations of a business, to check and collect all data, detect any tampering with accounts, point out defects in bookkeeping methods and plan better systems, forecast tendencies, and summarize all his information in the form of an intelligent, compact report known as an audit. He must be so sure of his accuracy as to guarantee the correctness of this audit, since important business decisions often are based upon it.

The head of the bookkeeping department of a firm is sometimes known as a head bookkeeper, auditor, or **chief accountant**; and his duties are sometimes merged with those of **comptroller** or **treasurer**. It is possible to rise to the position of auditor within a firm largely by experience and a study of the work itself, although progress is apt to be slow, irregular, and the results of his work unsatisfactory, unless such experience is accompanied by training in at least the lower stages of accountancy.

### **98. Becoming an accountant**

The full step from the trade or craft of bookkeeper to that of the corresponding profession is only attained by a thorough study of accountancy. The training for an **accountant** cannot be obtained in an ordinary lifetime on the job. The necessary training may be obtained in many resident schools or universities and is offered in many forms by correspondence. The ready accessibility of such training makes it particularly easy for the bookkeeper to lift himself out of the tedious, hopeless monotony of his position to that of the much broader, creative, and more remunerative profession of accountant.

The qualifications of an accountant differ decidedly in quality as well as in quantity from those of a bookkeeper. Within the business he may specialize in credits, in costs, or in traffic—three of the principal lines of division. He must be able to design accounting systems that meet the requirements of any special business and to so design them that they will supply prompt and accurate information on the cost of any process. Such a system should show the efficiency of labor by departments and sometimes by individuals and classes, as well as for the plant as a whole, with an analysis of the reasons for any changes in cost. It should provide similar information for material, machine management, and transportation costs.

All facts should be so classified and presented as to show costs of production of any division of a product. The system should automatically analyze sales, showing the cost of selling each line and the profit, according to goods, territory, salesmen, and classes of customers, whenever such information is desired. All information should be compiled and presented in clear, compact, and, when desired, graphic form for the use of executives.

### **99. Many kinds of accounting**

There is almost endless specializing in the field of accounting, since there must be as many kinds of accounting as there are industries. The Federal Civil Service lists many accountants, but the qualifications of those who deal with common carriers in the office of the Interstate Commerce Commission are very different from those who work in the the post office, or in the army, navy, or agriculture departments. The accountant in a packing plant deals with problems far different from those in a machine shop, a cotton mill, or a department store.

Recent developments have laid new demands upon accounting. The first systems followed too closely the work which has just been described as belonging to the field of the auditor and the bookkeeper. Such systems only report what has already taken place. Modern business men want to know what will happen. They want estimates of costs in process, and they want these so detailed, specific, and prompt that it is possible to check from day to day whether estimates are being met, and to know what action should be taken to anticipate as well as to rectify mistakes.

To design and install such a system of accounting calls for much knowledge of the profession of a planning engineer. The accountant who serves in a consulting capacity must know the principles of business management and much of the field of management engineering.

### **100. Mental ability needed**

Modern accounting calls for high mental abilities, for accuracy, initiative, imagination, keen observation, good judgment, and willingness to study hard along a single line for several years.

Recent forms of taxation open new fields to the accountant. He is not only called upon to assist in the intricate calculations necessary for the Income Tax laws, but to devise systems of accounting that automatically produce the information demanded by such laws at the close of each year.

The chief accountant in any firm is on the road to the highest executive positions. He is immediately in line for promotion to comptroller, treasurer, or general manager. A knowledge of accountancy will help him to attain any of these positions, even though he be advancing through other lines of promotion. Modern business is concerned with costs and profits, and these are the fields in which the accountant is equipped.

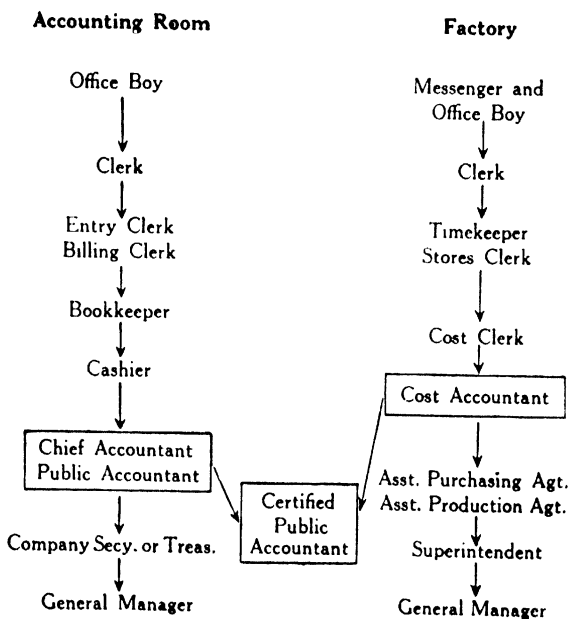
If he wishes to act as a public accountant, selling his services wherever they may be needed, he will find it greatly to his advantage, in most states, to become a certified public accountant. To do this he must usually take an examination and reach a certain grade fixed by law. This recognition by the state gives his services an authoritative value which makes them much more in demand.

The accountant is called upon in nearly every great crisis in industry. His services are needed when one business is to be succeeded by another, or several to be joined in great combinations, when a partnership is to become a corporation, a bond issue anticipated, a reorganization of any kind to be undertaken, or whenever a general report by an impartial outsider is desired of any business or department. He is called upon in nearly every large receivership, and his advice is frequently sought before any important change in policy or management. He is coming more and more to be called upon to design methods of production control in cooperation with planning engineers.

### 101. Lines of promotion

As yet there is really no standardized method of organization common to this department of industry. In many cases the logical steps are from clerk to junior accountant, to senior, and then to head accountant.

Some of the more common lines of promotion that lead to or pass through the accountant's position are given in the following table:



## CHAPTER VII

### Advertising

#### 102. Simultaneous selling to millions

In discussing the work of the merchant, it has already been pointed out that the foundation of all commercial work is salesmanship. Advertising is a specialized form of salesmanship which has arisen out of the conditions of modern industry. With the increased size of business, the expansion of the market, due to improved methods of transportation and communication, and the great growth of periodicals, it has become possible to sell to millions simultaneously. To do this efficiently, the new profession of advertising has arisen and grown until at present it is estimated that between two and three billion dollars are spent annually for various kinds of advertising in the United States. Advertising, rather than subscriptions, is now the main source of income for nearly all publications. Without advertising most of the popular magazines and newspapers with large circulations would be impossible.

Advertising, by making available millions of customers for any article, has built up some of the largest businesses. Some industries are so closely dependent upon advertising that they consider their trade-marks and the good will built upon publicity as by far their largest assets.

Three distinct methods of advertising are used. The most important makes use of the periodicals; the second is known as "direct by mail" merchandising and is conducted by means of catalogs, pamphlets, circular letters, and similar material sent directly to the desired customer; the third method uses billboards, street cars, and posters.

### 103. Organizing a campaign

The technique of these forms is so different that they are sometimes conducted entirely independent of one another. With most commodities, however, it is possible to organize what is called an "advertising campaign," selecting one or more of these methods of publicity according to its suitability for the purpose. The first step in organizing such a campaign is to determine just who the possible purchasers are and how much they may be expected to purchase. For this purpose a survey is made of the available market, which often involves very extensive investigation, either personal or by mail, and the compilation of the results of such investigation by sometimes complicated statistical methods. This form of work has become a subdivision of the profession of advertising and employs many persons. The qualifications for this branch of work are ability to prepare questionnaires and plan other methods of collecting and analyzing information, and skill in compiling results in a compact, easily available form. It usually involves a course in the gathering, assembling, analysis, and presentation of statistics.

The second step in an advertising campaign is to analyze the goods to be sold, determine the trade names to be used, and their selling points. This selection of a name, or trade-mark, has become of great importance, and such made-up words as "Uneeda," "Kodak," "Coca Cola," and others that will occur to every person because he has seen the advertising describing them, are now valued at millions of dollars. In some cases this value has been confirmed in court suits for infringement.

The third step is to determine the best methods for reaching each class of customers. This may involve the use of periodicals, or "direct by mail" mediums, or posters,

or any combination of these. By methods of testing it is possible to determine with great accuracy the results obtained from any form of advertising and to decide where to expand or contract the money to be spent. Quick and accurate judgment in this direction is one of the most valuable assets of an advertising man. Such specialization with the complex character of the work has made advertising a highly skilled profession and raised the standards of success.

#### **104. Psychology and advertising**

The successful advertising man must know how to use the arts of illustrating, typesetting, and writing. He must know a great deal of the science of psychology. He must know this from two points of view—that of the buyer and that of the seller. He must know how to write and arrange his publicity to attract attention, arouse interest, and lead to purchases. On the other hand, he must know the comparative importance of desires on the part of possible buyers and their capacity to gratify these desires. He must know how to find out these things for a great number of people simultaneously.

Advertising is divided again from another point of view, according to the way in which the industry is conducted. Many industries that do a large amount of advertising have their own advertising manager. He may have working under him one or more copy writers, who may be organized under a copy chief, an art director with a possible staff, and one or more space buyers. The copy writers have the work of writing the advertising matter. The art director secures illustrators, and either does the make-up or arrangement of the material so as to make an attractive display himself, or turns it over to a special



**make-up man.** The space buyer must know the value of all the various mediums. He usually has a definite appropriation which he must divide, among periodicals, direct mail publicity, and posters or billboards, in a manner to bring in the greatest return for the money invested. He must keep accurate records of results obtained from all these mediums and be ready to shift his purchases of publicity or to change the form of his copy as his returns indicate.

Another form of work in the advertising field is that of the free lance, who sells his talents for gaining publicity wherever he can find a market. Much of his work is known as "press agentic" and consists in giving publicity to individuals or articles for sale through news stories or by paid notices. He may also prepare copy and sell his ideas to advertising managers or agencies.

#### **105. Advertising agency**

The third form of organization is through the advertising agencies. These have grown to very great size in recent years. They must have the accounts of many different firms and deal with all the mediums of publicity.

When an important advertising campaign is to be planned by an agency, the heads of the various departments are called in and the special knowledge of each focused upon the problems in his department. The result is an advertising plan combining the specialized knowledge of all. This work of laying out a campaign is perhaps the highest type of advertising work and is usually done by the heads of the agency.

Another important line of work in an advertising agency is that of the copy writers, who usually work under a chief copy writer. It is their business to analyze the

sales points of the various articles purchased by the agency and to determine the best method of presenting these points through the various methods of publicity. The writer of advertising copy, unlike the author, is not paid according to the number of words he writes. Advertising calls for a condensed, emphatic style of writing without losing the personal appeal or clearness of thought. The copy writer works with the services of an art director, who may have several artists working according to his directions. As a usual thing these artists are not employed continuously by the agency, but are hired to prepare illustrations for special copy. This is because each artist usually has some fields in which he is peculiarly effective, and it pays him better and is more satisfactory for the agency to have him work in this field for as many agencies and advertising managers as he can.

#### 106. Space buying

Another important phase of agency work is space buying. The space buyer for an agency must possess in a higher degree all the qualities required for a similar position with an individual firm, because he must buy space for many firms. It is his business to know just how any particular form of merchandise or service can best be marketed. He must know the prices of space in all periodicals and the relation of that space to probable returns for all the articles his agency handles. He must know the exact field reached by all agencies of publicity and the possible purchasers for various commodities in those fields. Theoretically the space buyer acts as the impartial agent of the advertiser, but the exigencies of business often compel him to become rather a salesman for space in periodicals.

The real work of selling such space is the field of the advertising salesmen, who are usually known in the trade as "contact men," because it is their business to maintain continuous contact between the clients and the agency. While an important phase of their work is the soliciting of advertising accounts, a contact man who confines himself to this work will not be successful. Here, as in many other fields of salesmanship, it is necessary for the salesman to render continuous service. He must point out new opportunities for advertising and show where and how the agency can develop new business. He must have considerable knowledge of all branches of the advertising profession so as to be able to search out possible advertising campaigns, suggest new copy and other methods of developing business. These salesmen usually work on a commission.

#### **107. How to get in**

Entrance into the field of advertising is from many directions. One of the most common entrances is that of salesman to an agency. Many persons also obtain an apprenticeship with a firm as assistant to an advertising manager. Others enter the field directly as a free lance by preparing copy for some firm and then selling their services direct to that firm. The person who has studied advertising, and perhaps had some experience on a newspaper as a writer, can usually get a position as copy writer and can then work up to the higher-paid positions.

Some of the qualifications are: initiative; ability to mix and to make friends; and, perhaps more necessary than anything else, originality in ideas. Advertising depends upon attracting attention, and it is always the unusual that attracts attention. The man whose mind is

a factory for the continuous production of new ideas can probably make more money in advertising than in almost any other field of industry.

Within recent years advertising, like nearly every other profession, has been reduced to fundamental principles which can be taught. Anyone who proposes to become a worker in advertising should take advantage of some of the training courses offered. He should study the elements of psychology as applied to advertising, the science of statistics based upon market investigations, and the technique of analyzing business opportunities.



## CHAPTER VIII

### Manufacturing

#### General

#### 108. A growing industry

The United States is the greatest manufacturing nation in the world. More men and women are using machines for making things here than anywhere else on earth. The proportion of the population engaged in manufacturing increases each year.

Labor, and especially skilled labor, is the most important element in manufacturing. Raw material gains value in proportion to the skill and strength added to it. Nations gain industrial supremacy in proportion to the amount of skilled labor they can put into their products. Raw material depends upon natural resources and may be exhausted. Skill creates itself.

Although the United States leads in quantity of manufactured product exported, it is still far behind other nations in the amount of labor it puts into each unit of product. It still exports too much raw material for other nations to work up. It was stated before the War that the United States was selling 2000 pounds of goods for \$100; while England was selling 1000 pounds, France 100, and Germany 30 pounds per hundred dollars. Nations with highly skilled labor, like France, Germany, and Belgium, put so much skill into their products that they can buy raw material here, work it up, pay freight both ways and our tariff, and then undersell us in our own markets. Their workers mix a lot of brains with their work.

Their workmen are highly trained. All over the world the rule holds that the greater the skill, the higher are wages and profits, and the larger the amount of wealth flowing to the nation producing the goods. The money a nation spends on industrial education comes back multiplied. This is just as true of the individual worker.

### 109. Putting brains into work

The miner who digs the iron ore, or the worker who smelts it into pig iron gets low wages and adds little to the value of the product. Those who make it into machines add more value and get more out in wages. When made into surgical instruments or watch springs, the value added to a ton of pig iron and the wages paid for doing it may reach hundreds of thousands of dollars—yet it is the same pig iron.

Deciding to enter manufacturing or any other industry is not so important as deciding where you will go after you get in.

There are certain qualifications, without which, however, no one should enter the manufacturing industry. In general, it requires at least average physical strength, specially during the learning years. The most important qualification is possession of what is called the instinct of craftsmanship, construction, or curiosity in mechanical matters. If you never made a toy, pulled a machine to pieces, built things out of whatsoever material every boy has, did not care how the clock was made, or what caused the automobile to break down, or what made the sewing machine run, then it is doubtful if you will be happy or successful in the mechanical industries. If you did like these things, if you are willing to study mathematics, if your hand is steady, if your eye is accurate, and if you are

willing to work hard, then the future in this field is as wide as you make it.

The two broad types of labor, already discussed, are found in all departments of the manufacturing industry. Whether we are making watches, locomotives, or tin cans, every industry has a large number of workers in the three classes of unskilled manual, semi-skilled clerical, and ordinary trades. These mix the least brains and training and skill with their labor, add the least value to the product, receive the lowest wages, and perform the least agreeable work. They pick up their trades on the job and do little outside study. Through a long apprenticeship they may gain much skill and thus command better wages.

#### **110. Make every job a road**

These jobs should be looked upon as roads not residences, as opportunities for real life choices, not as final selections for a life work. There are usually at least two great choices of vocation and often many more in an average lifetime. One is in beginning work, when the broad field is selected. The other is when an average proficiency is attained, and a life choice of a better work, through extra exertion at the time of choosing, is at hand.

In this book we are concerned even more with the latter choice than the first. One of the lines of promotion which is common to all mechanical trades is through the supervisory force. The step to gang boss, assistant foreman, and even to foreman could formerly be taken without much outside study, but this is growing less true every day. Promotion to any sort of supervision will soon be open only to those who fit themselves by special study.

Promotion to a supervisory position calls for thorough knowledge of the work. Although this can be obtained



largely on the job, the person who takes advantage of shop courses in residence or by correspondence will be moving along a short cut that will bring him ahead in the race for promotion. The first advance is to some such position as gang boss or sub-foreman. In picking men for this work, employers give first consideration to ability as a workman.

### **111. Qualifications for promotion**

This ability shows itself in three directions: quantity, quality, and variety. Speed for quantity production comes from practice in the best methods of doing the work. It may be gained most quickly by a careful study of the motions made on the job plus practice. Quality depends upon practice, care in following instructions, and often upon wider knowledge of the methods used and the ultimate purpose of the product than can be obtained in the shop. Here outside study is helpful. When it comes to "variety" or the ability to do many allied jobs, and to know their relation to one another and to the finished product, shop courses of study are often essential and always a short cut. The man who can do but one thing will not be chosen to supervise several men doing different things, nor will he be picked out as a probable future foreman or superintendent over many men of different occupations. Yet wise employers do not promote a man to the first round of a ladder unless they think it is possible he may climb the rest of the way.

### **112. Up to the foremanship**

The step above boss or assistant foreman is that of full foreman. Here the character of the work changes radically. Lack of ability to make this change is the greatest obstacle to such promotion. A new kind of knowledge is needed. Before a man is considered for a foremanship,

it is taken for granted that he is a master of his craft. Now he is to be tried at another trade—that of managing. The craftsman deals with things. He handles machines, bricks, iron, and tools of all kinds. The foreman deals, first of all, with men.

Sharing the duties of the men and the responsibilities of the management, his job is such a complex of interweaving and conflicting activities as almost to defy analysis. He is, in turn, supervisor, production engineer, teacher, and executive. His success depends upon his ability to analyze, measure, and meet the demands of the complex factors of human nature.

He cannot learn all these things by experience. Experience, to be of value, must be based on classified and tested results of things tried. Results of a foreman's activities are often distant in time and space, and indirect and indefinite in effects. Like the doctor described by one of America's foremost physicians, he may "make the same mistake every day for twenty years and call it getting experience."

Such mistakes are one of the reasons why ninety per cent of American firms fail to make profits. The success of ten per cent speaks well for the ability of foremen to educate themselves in spite of difficulties.

Every advance in management makes foreman training more imperative and also more difficult to obtain by experience. Cost accounting based on data drawn from untrained foremen serves only to deceive. Systems of modern efficiency become nets of entangling red tape around the hands of untrained foremen. Modern personnel departments, wise labor policies, and liberal educational programs become irritations and costly encumbrances unless operated through trained foremen.

Because the foreman is really tackling a new job which he must hold while he is learning, his training must deal directly with his job. It must consist of an analysis of his duties, specially of the relations of different departments and of the human nature with which he must constantly work.

This is just the sort of training that he will need in all succeeding jobs of a managerial character. It will prepare him for the position of superintendent, works manager, or any other position where adjusting the relations of human beings is an important part of the work.

There are many special lines of promotion in the mechanical trades, besides the one common to all trades, that leads to and through a foremanship. Even those lines that pass through a foreman's job as one of the steps often reach it only after special preparation in other lines. Some of these roads of progress will now be traced.

## **Machinist**

### **113. Through the machine shop**

There are three main lines of entrance into the mechanical trades. The principal one is through the machine shop, but many come through either the drafting room or the power plant.

The machine shop is the widest gateway to the great field of manufacturing. It is not alone in the manufacturing industries that the machinist plays an important part. Every railroad, whether steam or electric, and almost every factory has need of the services of the machinist. The lower grades of machinist's work are often monotonous. The man who stands all day at a drill press or any great automatic machine and merely watches it perform the work without making any effort to use his brain in understanding the workings of the machine requires little skill, has little change, and, unless he makes use of his outside time, will often remain at such work for a lifetime. He must often work in greasy, dirty surroundings, and if one objects to these things, he should not choose this work.

Conditions in respect to air, light, and general physical environment are constantly being improved, as employers discover that money so invested brings good returns in increased productivity of labor. Consequently, the health hazard of the machinist's work is becoming comparatively low and a fairly long life can be expected. How much of this will be productive depends mostly upon the promotion gained. It is difficult for a man to obtain employment in the lower grades after he has passed the prime of life; but if he has made good use of those years, he should have advanced to a supervisory or specialized technical

position where a clear mind and a well-stored brain is of more value than physical strength and agility.

In the past, the accident hazard in machine shops has been large, and even at the present time many people are killed and injured annually by machinery. Every year sees the percentage of accidents grow less as safety measures are developed, and today the danger is probably no greater than in other lines of industry.

#### **114. Growing demand**

Anyone choosing an occupation wishes to know whether there will always be a demand for his services. We may be sure that the coming years will constantly increase the demand for men who know machines. More and more of the work of the world is being done mechanically. Every new invention of a labor-saving machine calls for more machinists. The demand is almost universal. Manufacturing is spreading into every section of the United States, and even of the World, so that it is now possible for a machinist to find employment in whatever section he may desire to live.

While the great mass of those who enter mechanical trades remain on the lower levels we have already described, there is no field in which there is greater opportunity to rise. The working days are growing shorter, and many lines of industry require but eight hours daily. This gives time for study. Large industries are usually located near great cities where there are ample educational facilities. The more progressive plants are realizing the importance of putting brains into their product through the minds of their employes, and are developing extensive systems of plant education. In looking for a position, this fact should never be neglected. It will pay to pick a firm

that offers opportunities for education. There are few fields in which correspondence work has been more thoroughly developed than in this line.

### **115. Machinist's wages**

Wages in the machinist's trade vary widely. According to the United States Department of Labor, the average wages per week for machinists were \$19.48 in 1913 and rose steadily to \$37.99 in 1920. For machinists' helpers the corresponding figures are \$14.18 in 1913 and \$28.36 in 1920. The variations in wages depend on the work and the location, but far more on the skill of the machinist. The machinist's trade is usually a regular one, little affected by weather or other conditions. Each year firms are finding ways of making it less and less dependent upon seasonable conditions.

Because much of modern machine manufacture is done with "automatic" machines, such as punch presses and screw machines, or by the application of "jigs" and automatic fixtures to drill presses or other machines, which make these almost automatic, a much talked about theory has arisen, namely, that brains, skill, experience, and training are growing of less importance in the machine trades. There is a common idea that it is possible to "put the brains in the machine" and dispense with brains in the worker. Industry is learning the falsity of this sort of reasoning by some rather expensive experience.

### **116. Brains must be in men**

The truth is that the more complex the machine with which the man works the more he needs to know; not simply to watch it—he can do this without much intelligence—but to keep it in order, to suggest improvements,

and to get full service out of it. Unless the machine tender can think over again in his own mind the principles thought out by the man who invented the machine, unless he can care for and repair that machine, and unless he can see his work as a step toward better things, then work will be poor, co-operation slight, and hostility to the job and to the industry intense and harmful.

There will always be need for machine tenders. There is no reason why anyone should not do such work for a while, and so do his share of the world's drudgery. But no one of normal mental ability should do such things for a lifetime. He need not accept such a fate. He can find plenty of opportunity for a study of the principles of machinery. He can fit himself for better work, and having so fitted himself he will always find it much easier to get a position at higher paid, pleasant work than at the disagreeable drudgery.

The machinist of today needs far more education than the worker of any previous stage. If he is to be really efficient and bring the highest contribution to industry, to society, and to himself, he must know the laws of physics upon which the operation of modern machines depend. He must know the mathematics by which they are designed. He must know something of the complex organization of a machine-built society. Knowing all these things, he can rise upon the shoulders of the great inventors of the past and take his place as a contributing and receiving member of a mechanical age.

There are very many subdivisions of the machinist's trade. The person who depends upon "picking up" his trade in a shop will seldom get an opportunity to learn all the trade. He is apt to remain a "monkey wrench machinist," able only to watch some single process and put on

and take off the necessary attachments with a monkey wrench. The U. S. Department of Labor lays down the following as the qualifications of an "All-Round Journeyman Machinist:"

### **117. What the machinist needs to know**

He should read drawings to the extent of making orders for materials, making construction layouts, and obtaining a full comprehension of mechanical requirements from the shop blue-prints.

He should use skillfully the ordinary machinist's tools, consisting of steel rule, square, hammer, center punch, scratch awl, dividers, inside and outside calipers, combination set, protractor, micrometer, surface gauge, trammel points, depth gauge, vernier caliper, bar caliper, drill gauge, thread gauge, thread micrometer.

It is desirable that he know the mathematics of pulley ratios, feed gear ratios, back gear ratios, taper computations, speeds and feeds, and change gears for thread cutting. This would require a knowledge of the following mathematics: common fractions, decimals, proportions, simple algebraic equations, use of formulas, square root, making and reading of graphs, solution of right-angled triangles.

He should have a general shop knowledge as follows: belts, pulleys, lubricants, to include oils, greases and cutting compounds, counter shafts, line shafts, cone and geared head machines, motor drives, fits and finishes, cutting speeds, gear combinations, general knowledge of thread systems, standard V and square threads, special threads, double and triple threads, standard tapers, and polishing materials, use of handbooks, reference books, and catalogs.

He should know the names and care of common machine-shop tools, such as wrenches, clamps, dogs, arbors, chisels, hack saws, files, scrapers, dies and die holders, reamers, hand drills, and breast drills. He should have a working knowledge of cast iron, wrought iron, malleable iron, machinery steel, cold rolled steel, tool steel, high speed steel, brass, copper, Babbitt metal, and solder.

He should also know stock sizes of common machine-shop materials such as washers, bolts, nuts, machine screws, cap screws, set screws, etc.



He should operate skillfully the standard machines to do the types of work indicated below, and should be able to grind and oilstone all the cutting tools used.

Then follows a list of seven standard machines and sixty-one types of work which the machinist should be able to perform.

The required schooling is given as "Not less than common school; preferably high school or college."

### **118. Calls for study**

Such a training can scarcely be obtained in a lifetime through experience alone in ordinary machine shops. Only a thorough course in machine-shop practice plus considerable experience at the trade will equip a man as a thorough "journeyman machinist." This is the first round of the ladder of progress within the machine trades. It is the point that less than a majority of those who enter the trade ever reach. It is the point from which the real choice for promotion to the most desirable positions can be made.

One of the most important things to know about any occupation is the opportunities it offers for further growth beyond the day laborer, journeyman stage. The lines of promotion open to the trained machinist are so many that one of the most important things to be done by those who have made their first choice in this field and attained to this point is again to choose the line in which further progress will be made.

This is the danger point in the young mechanic's life. Many young men, finding that they can earn living wages without any great amount of knowledge or experience, settle down as machine hands, knowing but little more than one operation of one machine. Instead of becoming real machinists, they become only machine tenders. They

may be essential as parts of the machines which they operate, but they are useless anywhere else; and any day a real machinist may add to their machine another action enabling the machine to do without them.

### **119. Up to toolmaker**

Every shop of any size has at least one toolmaker who does nothing but repair or make tools for the other workers. He needs to know the possibilities and limitations of the different varieties of tool steel; to understand welding, tempering, annealing, and hardening; to know something of forging and foundry work. Usually he goes from a machine to the tool shop, for it is necessary for him to know the use of the tools which he is called upon to make.

This is another critical choosing point and progress without outside work is almost impossible, since the next higher positions are usually not open to those who do not have a knowledge of elementary physics, chemistry, accounting, mechanical drawing, designing, and principles of business organization. If these were gained before entering the occupation, so much the better; if not, there is always ample time and opportunity to gain them.

### **120. Tool designer**

It is this knowledge that lifts the toolmaker to a designer of tools, and then into the Engineering Department of a factory, generally via foremanship of the tool room, provided it is accompanied by preparation in the methods of handling men by the study of a good foremanship course. Promotion in the Engineering Department demands a thorough course in Mechanical Engineering. This prepares for planning and designing tools, passing on the purchase of machinery, deciding upon its location, and

meeting all the many engineering problems that arise throughout a great plant.

The **shop foreman** has charge of a certain part of the shop, perhaps a floor or a department. He lays out work for other men and for the machines, so as to get the greatest efficiency of both men and machines. He needs to know something of cost finding to tell whether or not his department is being run at a profit; to understand all sorts of tools and machines, metals, and processes; and to be able to get the most work out of his men with the least possible friction. He must be equal to any emergency, ready to meet any shop trouble or breakdown with the knowledge that will set the wheels turning again with the least possible loss of time; and that means often that he himself must do the actual repair work or discover why a certain machine is not doing its work.

The **master mechanic**, who, as his title implies, must be master of all the mechanical devices and processes used in the shop or factory in which he is employed, is over the various shop foremen. To him come the problems which the foremen are unable to solve; and upon him rests the duty of operating the plant at its maximum capacity and efficiency.

The **assistant superintendent**, on the other hand, is less concerned with the details of operation than with the personnel. He is "the super's right-hand man" in all matters affecting employes and is often the one who hires and fires for the whole plant.

The **shop superintendent** is the boss of the entire mechanical force of the shop or factory; though he is usually responsible to a general manager. While he needs to be a master mechanic, he is more concerned with men than with machines. The shop foreman, the designers, and

often several mechanical engineers are his lieutenants, and through them he directs the work of the shop. He needs executive ability and a knowledge of business methods; and he needs a knowledge of office work as well as shop work, for he usually has a force of clerks and stenographers under him. He may boss a shop which produces only one article, as a typewriter, a bicycle, or a sewing machine; or he may be head of a plant which manufactures a large list of specialties; or, if he is in the employ of some great railroad, he may be concerned only in keeping the rolling stock in repair.

### **121. Working up from the drafting table**

The young man who has a liking for drawing would be wise to serve a short apprenticeship in the machine shop in order to learn how things are actually done there; but as a rule he prefers to go immediately into the drafting room.

At first, he is employed as a **tracer**, inking in the penciled drawings produced by more experienced men, or making blueprint duplicates of the finished drawings for use in the shop.

When he has attained some degree of skill, and proved himself painstaking and accurate, he is given a job as **detailer**. To his table come the big general drawings from the draftsman, and he must learn how to take out the various parts of an intricate machine, and make working drawings of them which tell each worker just what to do. Every one of the twenty-three thousand and odd parts of a locomotive must be reproduced in ink before it can be reproduced in steel or brass or wood; and the location of each bolt and rivet must be fixed before the drawings go into the shop.

The **draftsman** combines and elaborates the sketches of the designing draftsman into general drawings which show the complete working out of the designer's idea. Often he is a specialist in one branch of work, as in the case of the sheet-metal pattern draftsman, who specializes in patterns for cornices, skylights, etc. Many draftsmen choose to stick to the drafting table, because they can earn good salaries through their skill in some special line; but the way to promotion is open to them if they will improve their opportunities.

### 122. Creative work ahead

Once more we are at the point where a choice must be made between a lifetime of what will soon become monotonous work in a drafting room and promotion to the creative, interesting, and highly remunerative work of the positions above. Progress, even to this point, has demanded considerable outside study because it is seldom possible to become a competent draftsman without such work. As a minimum, a high school training is necessary, and if it has not been obtained before, it should be taken at this point. For further development, a knowledge of all branches of Mechanical Engineering is necessary.

The **designing draftsman** takes the designer's ideas, which are usually in the form of rough notes and pencil sketches, and works them up into more complete form. He must be a man of experience and intelligence as well as an expert draftsman, so that he can check up his superior's suggestions to see that they are complete and practical.

The **chief draftsman** is in general charge of the drafting room and gives out the work and keeps his force working efficiently. His chief duty, however, is to check the

figures on the finished drawings, calculate strains and stresses in heavy work, and estimate quantities and costs. An error of a hundredth part of an inch in a working drawing may cause a big waste of time and material; while a mistake of a quarter of a cent in estimating production cost on a million-dollar order of small parts may either cost his firm the job or cause it to take the contract at a loss on every part manufactured.

### **123. In the executive positions**

The assistant superintendent has much the same position and duties in the machine shop or factory as has the shop superintendent under whom he works. In the drafting room, however, the assistant may be promoted to chief designer, and then to mechanical superintendent.

The **chief designer** might be called a silent and hidden boss. He comes into contact but little with the men and the actual operation of the shop, but issues blueprint orders that are imperative. He is not an inventor or originator, but rather an adapter or improver of the ideas of other men. To him come the shop superintendent, with orders for the entire shop; the inventor, with ideas for a new gas engine; the shop foreman, with suggestions for an improvement in a milling machine; and it is the business of the designer to work out these things in conformity with the limitations and possibilities of the material in hand so that the drafting-room force can reduce them to drawings and blueprints which the mechanics can understand and so make possible their reproduction in the shop.

## **Steam Engineer**

### **124. Another open door**

The third line of entry into the mechanical industries is through the engine or boiler room. It is possible to start without much preparation as a **boiler-room laborer** whose chief business is to be generally useful about the place, keep everything clean, and relieve the other men of such duties as can be safely entrusted to him. On his promotion to **fireman**, the need of outside training will begin. The modern fireman must be a machinist capable of handling automatic coal handlers and stokers; he must know enough of physics, chemistry, and the principles of boiler practice to get every possible calorie of heat out of a ton of coal without sending smoke up the chimneys. The job of such a fireman is something very different from that of a coal shoveler of former days.

When he becomes a **water tender**, after perhaps having spent some time as an **engine room oiler**, he has reached another critical point in his career. This is where most of the people who enter by this route stop. If he is to go on and be an engineer, he will need a full course in Steam Engineering.

All the way after leaving the position of ordinary skilled craftsman, the opportunity for choice of the worker in a manufacturing industry becomes wider and wider because his knowledge has become greater. After reaching the position of foreman and studying the methods of handling men, he can, if he wishes, specialize in personnel work. This leads to the new profession of Employment Manager or Director of Personnel Relations. Here, while he may begin as an employment clerk, keeping records and occasionally interviewing applicants, he cannot proceed far without special training.

### **Automobile Engineer**

#### **125. Growing opportunities**

So swift has been the growth of the automobile industry that while a child of the present generation, it now is exceeded by no other single line of machine manufacturing. Most work in an automobile factory is some special application of trades already discussed, and, in particular, that of machinist. The automobile machinist should be highly specialized. He does one job over and over again usually at a high rate of speed and with the most perfect automatic machinery. He works but short hours and receives good wages. His line of progress is no different from that in any other machine shop. He will naturally advance to the position of foreman if he has fitted himself for that position, and there he is apt to remain.

There is no field in which there is greater opportunity for promotion to higher places, if the steps leading to that promotion are taken. Few indeed of the mechanics who work in an automobile factory are thoroughly familiar with **Automobile Engineering**. They confine themselves to the one job that is learned by experience, and, if that job is changed, they have lost their job and often their trade. Taking part in the building of an automobile gives them a splendid opportunity to make use of the time that remains after the comparatively short working day to master this new means of transportation.

#### **126. Be an automobile engineer**

There are many courses offered in residence or by correspondence that thoroughly fit a man for the position of automobile engineer, and these are easy for the person who has already learned the practical side of the work by



experience. Such a study fits for a position as expert engineer in any one of the multitude of positions for which every automobile factory is constantly seeking persons.

Automobiles, whether run by gas or electricity, always have many electrical appliances, and the worker who knows these appliances and will take advantage of the opportunity to add to his practical experience the scientific knowledge of electricity will find himself promoted from a shop worker at a trade to the position of specialist in this particular field. In other words, the key to promotion in the automobile industry is to be found in the fact that like any new industry it is rapidly developing new features calling for higher specialization. Choice here is of the line in which the person who wishes to rise shall specialize. The man who will familiarize himself with all phases of automobile construction can advance from machinist or electrical worker to that of tester either in the shop or on the road. Further training fits him for expert and research man. Here there is the same sort of opening that is to be found in the whole electrical field for the one who has creative imagination, based on a thorough knowledge of the fundamentals.

### **127. Running your own garage**

There is another wide field open to those who know automobile construction, based upon the oft-repeated observation that "it is not the original cost, but the upkeep" of an automobile that's expensive. The unlucky automobile owner is the foundation of the great industry of automobile repairing. There are few towns today without garages and repair shops. The work is that of a specialized machinist. It requires complete knowledge of the automobile. Some of the larger shops demand specialized

knowledge of certain automobile parts, such as ignition systems, valves, or transmission. The mechanic who is to succeed in automobile repair work must not only have the ordinary machinist's knowledge, but he must know all the standard makes of cars. This he can scarcely learn by experience, and, if it is to be complete, it must be based on a course of Automobile Engineering.

Entrance into the trade is usually by the job of helper who works with a mechanic and learns the job. The mechanic gets about sixty cents an hour and is just at the point where he must decide upon the division of this vocation that he will choose. He may become a specialized machinist in the making of automobile parts and repairs, using the ordinary machinist's tools plus some special ones for this purpose. He may master the electrical field as related to automobiles, or he may concentrate his interest upon the repair of tires.

No one of these fields is wide enough to demand all of a man's time, and it is possible by a course of study to master all of them and fit oneself for the position of inspector in a garage or for foreman. From here the next step is usually to that of manager or owner of a shop. This is the step that often proves to be downward to failure rather than upward to affluence. In most cases this failure is due to a lack of business management. Before attempting it, there should be a study of at least elementary accounting and the general principles of business administration and salesmanship.\*

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\* See pp 25 121

## **Jeweler**

### **128. Love of adornment**

This is one of the oldest trades in the world. Ever since man and woman have loved adornment, there have been those skilled in working stone, shells, and finally metal into forms that pleased purchasers. In modern times, jewelry making has become largely a machine trade. This is especially true of the cheaper grades of bracelets, rings, and similar articles which are now stamped out by machines, much as are parts of an automobile or sewing machine. Indeed, there is often far less of skill and artistic merit in so-called jewelry than in many pieces of machinery. Such work is little different from that of the ordinary machinist.

There is still, however, much jewelry made by hand. This is specially true in the higher-grade platinum and gold jewelry. For platinum work, the first step is the preparation of a design. The artist who makes this, usually in the form of a pen and ink line drawing, receives from \$35 to \$100 per week, according to his skill in producing artistic work. From his design the modeler makes a model in wax. Often the designer is his own modeler. In any case, the modeler must be a skilled workman, who receives wages almost equal to the designer. The work then goes to the engraver, who, by hammering, cutting and other processes, builds up the complete article. He receives from 75 cents to \$2 an hour according to locality, skill, union conditions, and other factors that make payment in the trade extremely variable.

If precious stones are to be used, the stone setter puts the work of the jeweler into a bed of shellac to hold it firmly and mounts the jewels by working up beads out of

the flat metal to hold the stones in place. He is paid from \$40 to \$125 a week, again depending upon his skill. The workers in gold usually receive somewhat less than those in platinum.

The demand for labor varies greatly with general business conditions, but a good jeweler seldom finds difficulty in getting employment. In large sections of the country, the trade of jeweler is combined with that of engraver and watch and clock repairer. In some of the smaller stores, he may also be a proprietor or salesman. The main road of advancement is to that of foreman in the factory or to owner of the smaller shop.

### **Traffic Manager**

#### **129. Unites industry and transportation**

The large industry of today depends upon transportation. Its sources of supplies and its markets are often continent- and sometimes world-wide in their sweep. The necessity of organizing the relations of the business to transportation has brought forth the position of traffic manager. The complexities of transportation require long study if they are to be used in the most profitable manner. The steam railroads of the United States alone have a multitude of overlapping systems of tariff and a network of routes between all important points that vary as to time, cost, and many other items. The legal relations of common carriers are intricate. When to the complexity of the railroad system is added the possibility of choice between water routes, both domestic and foreign, electric railroads, auto trucks, and now, for some commodities at least, aviation, it is seen that only an expert in this field can properly watch over the interests of a large firm.

The traffic manager must know how to pack and classify shipments. This in itself is becoming another skilled occupation. The making of boxes and other containers has been found to carry such possibilities of economy that the packing engineer is a growing profession. Such apparently small items as the number and kind of nails to be used with each kind of wood in packing, lining of boxes for foreign trade and packing different articles within the boxes have sometimes yielded, by the application of better methods, very large economies.

#### **130. Things he must know**

The traffic man must know all of the "paper work" in connection with shipping. He must understand the prep-

aration of forms that will be legal and that will apportion responsibility where it belongs. He must know a multitude of freight classifications and just which ones can best be used in specific cases. He must often use a combination of different forms of transportation to deliver his goods to the destination in the best and cheapest way. He must know when time will permit him to select cheaper routes and where the greatest speed can be obtained when this is the first consideration. He must know how to conduct all the legal steps up to the point where they are turned over to a lawyer, if this becomes necessary in the relations between his firm and the common carriers. He must know how to maintain the fullest possible cooperation with all officials of transportation companies.

### **131. Organizing his staff**

He must have sufficient organizing ability to develop his own staff in the best possible way. In the organization of this staff he will, if the business is a large one, have a department dealing particularly with the records of transportation. This department must tend to the rating, routing, and billing of shipments, and be familiar with all the relations that apply to this work. If the firm has a large number of salesmen or other people traveling, he must have relations with the passenger departments as well as with the freight departments of the railroads and other carriers.

He will have charge of a shipping room where all the work of packing, loading, trucking, and checking in and out of goods is handled.

In case the firm does business with foreign countries, importing its raw material or exporting its finished product, he will need to know all tariff and governmental regu-

lations not only of this country but of all the countries with which he trades. He will need to know the conditions which the goods must meet in those countries. In many cases the goods will be shipped on the backs of animals or even of persons and must be so prepared as to make such handling practicable. He will also have the same sort of accounting and clerical work that is a part of any large subdivision of a business.

Salaries in this work range from \$2,000 to \$5,000 a year.

Training may come by experience via the shipping room or any of the departments mentioned, but it should be supplemented by such training courses as are now available and that give the information needed in much more complete, compact, and readily applicable form than it exists in the classified jobs of the department.

This field is at present a steadily growing one and should offer many opportunities for some time to come.

## **Printer**

### **132. Offers wide opportunity**

The printing trade, while a very old trade, is still growing more rapidly than at any time in its history, and there is little reason to believe that it has reached its height, or that there will be a decline of opportunity in this field.

The trade is divided into many branches. The foundation of most of them is composition, and anyone who wishes to work at any branch of the printing trade should certainly know the fundamentals of typesetting. Nearly all printing work, even where machines like the monotype and linotype are used, depends upon standards established in the old hand-typesetting days. Even the pressman, if he is to work intelligently in many phases of make-up, must know something of the compositor's trade.

The compositor sets type from a case which consists of numerous compartments arranged so that the most frequently used letters are nearest to his hand. In setting up the type, he places it as it is to appear on the printed pages in a holder called a "stick." Long practice is necessary to acquire speed at composition, and since this form of typesetting is now confined largely to special work, the rapid compositor is becoming a thing of the past. Even for display work, such as newspaper heads and advertisements, machines are now available that can do the work much faster than it can be done by hand.

### **133. Room for artists**

The compositor who can do nothing more than set type according to orders and make it up in the most convenient way is not on the road to promotion. The most fruitful training for promotion at this stage lies in a study



of artistic printing. The compositor who knows how to select type sizes and faces and arrange lines and space with relation to borders, ornaments, and position on the page so as to make a pleasing appearance will never need to hunt for a job and can easily demand wages far above the scale ordinarily paid. The rules upon which such a pleasing arrangement depends have been standardized for centuries; indeed it depends upon principles worked out by the Greeks more than a thousand years ago and applied by every successful artist, no matter in what material he works, to this day; yet the average printer, even in the employing and managing class, is often almost wholly ignorant of this knowledge.

The trade is usually learned by an apprenticeship of about five years. In the shops where the union is strong, the apprenticeship contract is controlled by a joint agreement and provides just what the learner shall be taught during each year of his apprenticeship. Some non-union shops have established schools for printers. Many public and private schools have departments where the elements of printing are taught. The International Typographical Union has a correspondence course that is open only to its members, and that teaches design as well as the fundamentals of the trade. The employers' organization, known as the Typothetae, also has a very extensive system of trade education.

#### **134. Place of machines**

By far the largest percentage of typesetting is done by machines. The more common of these is the linotype, which sets and casts an entire line of type (whence the name) on a slug. Here the operator sits before a keyboard much like that of a typewriter, which he operates

to cause the movement of matrices in which the type is cast. It is generally held in the trade that while the work seems so very much different, a man cannot become a successful linotype operator unless he has first learned the trade of compositor. If he is to handle matter on the composing stone after it is set and make it up into pages, then he must have some of the knowledge of the compositor. Most linotype operators are printers who first set type by hand and then learned the machine by experience. There are numerous linotype schools where opportunity is afforded to practice on keyboards which are often not attached to a regular machine.

The monotype consists of two machines. The first of these is operated by a keyboard something like a linotype, but instead of casting the type directly, it punches holes in a roll of paper resembling those used in a piano player. This roll is inserted in another machine, and as it passes through, it operates a mechanism that casts each letter separately. The method of learning and qualifications are much the same as those for a linotype operator.

As the printing trade grows, like every other trade, it tends toward specialization. In the larger offices, one man will work continuously as a linotype operator; another as a stone man, making up the material; while a third will be adding whatever necessary hand composition is required.

### 135. Qualifications of "stone man"

The man who works on the "stone," as it is called, has his qualifications described by the Vocational Education Survey of Minneapolis, as follows:

He must be larger and heavier than a compositor in order to handle heavy forms. His general education should equal that of a good compositor, with additional proficiency in arithmetic

to figure margins, trims, and stock cuts. He needs all the trade knowledge necessary to a first-class compositor and must understand thoroughly the principles of imposition, that is, laying out various book forms to suit folds and various machine folds. Imposition is the art of arranging type pages on the imposing stone so as to cause them to appear in their proper places on the folded sheet. He must know how to figure margins, trims, and stock cuts, sizes and kinds of stock, so as to reduce waste in trimming; and must understand size, speed, and efficiency of presses so as to insure the most economical work.

He usually receives a somewhat higher salary than the compositor or linotype man and is considered in direct line for a foremanship.

Every printing office calls for the services of a **proof-reader** whose business it is to examine the proof which is taken of the printed matter and mark the errors upon it for correction. He is usually a former compositor, although this is becoming less and less the rule. He must be a judge of good English, thoroughly familiar with the type of punctuation and capitalization required by the establishment, have eyes that will stand a steady strain, and be capable of close observation. Lack of the latter qualification makes it impossible for many people ever to become good proofreaders.

### 136. Work of pressmen

Another distinct branch of the printing trade is that of the **pressman** who takes the forms made up by the compositor and prints from them. He usually begins as an assistant pressman, doing odd jobs about the pressroom, and finally feeding the press on less difficult jobs, while learning the trade.

The Minneapolis Survey, already quoted, describes the qualifications for a pressman, as follows:

It takes six to ten years to develop a first-class pressman. Deftness and delicacy of touch in the "make-ready" process,

physical strength and vigor, good eyesight, and a fine color sense are the physical characteristics demanded. He should be free from throat and lung trouble, because of the inks and acids used. Good hearing enables him to detect loose parts of the press, quoins, etc. The job pressman has similar duties and requirements, except that the work is on a small scale.

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His general education should include arithmetic, through mensuration and compound numbers, so that he can figure weights, sizes of papers, and pounds of ink to the job. He should know English well enough to recognize errors that have escaped the composing room; should know the simple principles of chemistry, for use in handling inks, and something about physics, especially principles of mechanics and atmospheric conditions to which rollers, inks, and paper are susceptible, and some of the simpler principles of electricity to guide him in making minor repairs. A knowledge of the principles of light and shade for use in the "make-ready," of half tones, of color harmony, and of hygiene and shop sanitation, is considered a desirable qualification by progressive pressmen.

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The common deficiency of the pressman is lack of general education and failure to realize the importance of scientific knowledge. The rapid development of presswork has left behind trade standards of ten years ago, without providing instruction for beginners, or affording opportunity for workers to keep abreast of modern methods. The average pressman would be far more valuable if he knew something of chemistry, physics, hygiene, and industrial art. Such knowledge cannot be acquired on the job. Workers should be encouraged to seek supplementary training in evening courses.

### 137. Wages of printers

Wages in the printing trades usually run from \$20 to \$50 per week with an eight-hour day. The variation depends more upon the size of the city than upon the skill of the worker, although greater skill is demanded in the large city establishments that pay the higher wages.

The foreman of the pressroom must have a still wider knowledge of the printing trade, as he is brought into close relations with other departments. He should be able to estimate the cost of materials, and especially the cost of work in the pressroom, and have a working knowledge of mechanics, chemistry, electricity, and hygiene as applied to presswork. He must also know the purposes of the various kinds of paper and inks and the capacities of many different types of presses.

These occupations represent the trade stage where skill is learned through experience. The next step to superintendent or proprietor of an individual shop has in the past usually been learned in the same way, and this is one of the reasons why failures in the printing trade have been very numerous. Investigation by various printing associations has shown that few printers have any exact idea of what it costs them to produce work; yet in the printing trade there is practically no production for the general market with its prices fixed by competition. Each job is bargained for separately and generally awarded on the basis of competitive bids. Not to know the exact costs of production is perhaps more quickly fatal in this trade than in almost any other, yet thousands of printers annually set up their own little shops without such knowledge. The printer who anticipates becoming a proprietor should first study the principles of artistic printing to improve his trade skill; then cost accounting as applied to the printing industry, to learn the trade of business management. He will then stand a greater chance of success than the person who enters the industry without such equipment.

### 138. Education needed

The qualifications for the printing trade are at least a common-school education. In many branches this is

becoming altogether insufficient, and a high-school training, or special training in English is being demanded for many positions. The trade is healthful, seldom requires any heavy lifting or any prolonged physical exertion. There is a slight danger from lead poisoning, but by proper attention to cleanliness and simple hygienic rules one can avoid this.

A very small proportion of printing today is done direct from the type. In some instances the type is used as an intermediate step for the making of plates. In other cases plates from which printing is done are made without the use of type. Stereotyping is used in all the big newspapers. In this process a wet paper matrix is hammered or pressed into the type, and then after drying, used as a mold for the casting of a metal plate.

The **stereotypers'** trade calls for considerable heavy lifting. The work must be done in a rather high temperature, and the molten metal gives off fumes that are sometimes injurious to health. The heavy plates must be handled while still hot, and, in newspaper work at least, at a very high speed, because this is the last step in the preparation of the printed matter for the press, and every moment's delay is extremely costly.

### **139. Photo-engraving**

Where cuts are to be made, various processes of engraving are used. The most common is that of **photo-engraving**. In this trade the picture or drawing to be reproduced is photographed by a special camera. The essential feature of the camera is a screen, which is a gelatin film or a sheet of glass with a series of very fine black lines upon it. When the engraving is photographed through this screen, it appears as a series of fine dots or lines. A combined chemical and photographic process

transfers this negative to a copper or zinc plate. The engraver, by means of specially designed machines and hand tools, does the necessary additional work required to prepare the engraving for the press.

The work is highly skilled, the trade closely controlled, and wages as high as in any branch of printing. The opportunities for employment are good. The trade is usually learned by an apprenticeship; and the greatest deficiency in skill is a lack of proper preliminary education and the artistic ability required for completion of the plate.

Another form of printing differs fundamentally from that done from type or from ordinary photo-engraving. This is known as "plate printing," and is used for the finest engraving. In steel and copperplate printing the lines are cut into the plate, which is then inked, and the ink wiped off, usually with the hand of the worker, leaving the plate perfectly clean except for the ink contained in the depressions made by the engraver's tools. When such a plate is then pressed against the paper, the latter takes up the ink from the depressions. This is the reason why an engraved card can always be told by feeling the raised lines upon it.

The trade of steel and copperplate engraving is very old, but, because of its great expense, is used only for certain special lines of work. The use of a gelatine plate and acid has in some ways simplified the trade, but it still remains one which calls for the highest skill and one which demands good wages.

Another form of printing is **lithography**. In its original form lithographing consists in writing or drawing the design upon a fine-grained lime stone with either a peculiarly greasy lithographing ink or with a crayon composed

of wax, turpentine, shellac, soap, and lampblack. In either case the drawing makes a greasy coating over the stone. The whole is then covered with an acid which eats away the parts of the stone not covered by ink or crayon marks, leaving the design in relief.

A large amount of artistic skill is required of a lithographer, as much of the work is done in colors. Recent improvements in the trade have simplified the work very much. It has been found possible to do work much like lithographing by the use of an aluminum plate which does not print directly upon the paper but which transfers its design to a rubber blanket from which the proper impression is made.

The lithographing trade is not a rapidly growing one. New processes, like rotogravure and the offset press with improvements in color work through photo-engraving, are making it possible to produce effects much like those of lithography at a much lower cost.



## **Clothing Worker**

### **140. Growing fast**

The trade of making ready-made clothing for both men and women, although it has existed since about 1840, has grown far more rapidly during the last twenty years than in all the previous years. In fact, the number of persons engaged in clothing manufacture doubled in the decade from 1900 to 1910, and still continues to increase.

The character of the industry has also been steadily changing. In the beginning it was almost exclusively a household trade. Garments were taken home to be finished and returned to a contractor. This was the infamous sweating system under which wages and living conditions were forced to a disgraceful level. Legal enactments have abolished or greatly restricted the home manufacture of garments.

There has been a corresponding growth of great factories with power-driven machines and all modern appliances. These factories are coming more and more to be owned by a few great firms that are able to make their names known through extensive advertising. As the industry has become a factory industry, it has been more closely unionized until today both men's and women's clothes are made largely in shops where the conditions of work are determined by the most elaborate systems of collective bargaining existing in America.

### **141. Great clothing centers**

The industry is highly localized in a few cities. According to the Cleveland Vocational Survey, in 1910 "of each 100 workers employed in the whole country, 41 were in New York, 10 in Chicago, 7 in Philadelphia, 5 in

Baltimore, and 2 in Cleveland." Since then, Rochester has also developed as a clothing center, and practically all the ready-made clothing is made in these cities. Anyone who wishes to enter the trade must live in one of them. More than half of the employees are women and a high percentage are foreign born.

The work is divided into a very large number of operations. The garment passes from hand to hand through many "sections" of workers, each of whom performs a very small operation. These sub-divisions may be grouped as machine sewers, pressers, cutters, designers, and foremen. Again quoting from the Cleveland Survey, "among every 100 workers, 47 are machine operators, 23 are hand sewers, 10 are pressers and ironers, 7 are cutters, and 4 are foremen. The proportion of designers to the total number of garments is about 1 in 150."

The trade is extremely seasonal and wages for the year are much lower than might appear from the weekly rates. The busy season runs from January through the spring months, and from August through the fall months. Manufacturers are now making great efforts to regularize employment by manufacturing for stock and by reducing the number of styles.

The Federal Board of Vocational Education gives the wages for a week of forty-four hours for the various classes of work as follows: Examiners \$25, pressers \$33, machine operators \$25, foremen \$25 to \$75, cutters \$20 to \$50, averaging \$35, designers \$50 a week up to \$12,000 a year.

#### **142. Designer has best job**

Most of the workers enter the trade as machine workers with very little preparation. Promotion is slow and

irregular. The most desirable job is that of designer, who, as the name indicates, designs the new fashions. In this country, he or she, because women are in every department of the clothing trade, usually follows Paris styles, making only sufficient deviations to stamp some sort of individuality on the product of the firm. The work of designing is usually learned through an apprenticeship to a custom tailor, and then, after a few years of work in various other departments of the garment trade, taking a course in designing.

One phase of the designing trade is scarcely touched in this country, and this deficit largely accounts for the fact that styles are still fixed in Paris. The Parisian designers have had thorough courses in real art. Even more important, they are thorough students of the wealth of material found in the great museums of Europe. Without a knowledge of the great principles of design and of its application through the many centuries that humans have worn clothing, there is little prospect that American designers will be able to wrest domination from their European competitors.

## **Boot and Shoe Worker**

### **143. Everything done by machines**

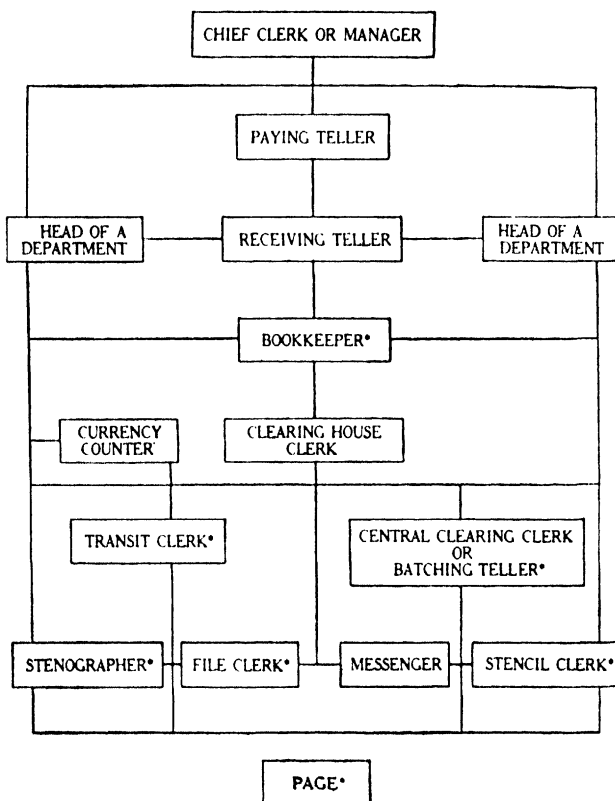
The boot and shoe trade is confined to a few states. The largest establishments are in Massachusetts, New York, Missouri, Illinois, and Wisconsin. As the trade is conducted at present it has very little in common with the work of the old hand shoemaker. Everything is done by machinery, and each process has been divided and subdivided until a report of the Bureau of Labor on the subject lists more than two hundred and fifty different trades now employed in the manufacture of a welt shoe. The work passes from operation to operation in a continuous stream, each individual workman performing but a very small part of the making of a shoe. This great subdivision has taken much of the skill from the work, so that at present it is possible to train new workers in a very short time.

There is little direct promotion within the trade. Advance is usually to the position of foreman or other executive position. There is also considerable opportunity to change from the lower-paid, less-skilled subdivisions of work to those for which a better wage is paid.

Hours are generally from eight to ten daily, and wages vary from 15 cents to 50 cents an hour, with a very few receiving the latter wage.

There seems to be a tendency in this, as in other highly divided trades, to realize that some means must be found to restore what might be called the "intellectual content" to the job. It has been discovered that even in the most mechanical trades, where the worker has been reduced to nothing more than a machine tender, training in the principles that lie back of the job makes possible greater productivity which can be reflected in better wages.

## Promotional Chart for Banking Profession



\*Indicates possible entering positions.



## CHAPTER IX

### Banking

#### 144. Old but changing profession

Old as is the banking profession, and it runs back close to the beginning of organized society, it has been subject to rapid changes in recent years. One of the great functions of a bank is to act as a regulating reservoir for the flowing resources of a nation. Into its vaults there trickle many streams from a multitude of depositors. The bank assembles these into the large sums needed for the financing of industry and places them through its Loan Department where they are available for production.

Another important function is to serve as a more efficient method of handling the complex financial transactions of an industrial society. The use of the checking account and the ability to transfer money through banks and clearing houses without the actual handling of currency means an almost incalculable saving in business. Other functions deal with trust funds, investments, the extension of security to savings, and the operation of safety deposit vaults. "An Analysis of the Work of Juniors in Banks," prepared by the University of California, divides the work and functions of every bank into four classes: "1. receiving deposits; 2. making loans; 3. transferring money and credit; and 4. issuing currency." These functions may all be performed by one or two bank officials or by many hundreds of employees, according to the size of the bank. It is the subdivision of these functions with the growth of the industry that gives rise to complex organizations and systems of training and promotion.

### **145. Legal control of banking**

Banking is always under some sort of legal supervision which tends to grow closer each year. The more important banks are organized as National or State banks, and a large percentage are working under the Federal Reserve Act which brings them under close and continuous official supervision. Practically all banks are corporations owned by stockholders who elect directors. These directors are generally more active than in most industrial corporations because the liabilities of the stockholders are more sharply defined. The Board of Directors usually has three committees—the Discount, Executive, and Examination Committee. The highest officials of the bank, who are appointed by the Board of Directors, are the president, one or more vice-presidents, and cashiers. Under these are the clerks who do the detail work of the bank, and their work may be divided into the executive divisions dealing with loans and discounts, credit, work of the auditor, analysis and statistics, new business, and trust. Another division is composed of the various tellers, and a third deals with the bookkeeping.

Banking has become a highly technical business calling for long training. This has hitherto been given within the bank, but at the present time a large number of universities are conducting courses in banking. The person who can take one of these courses is assured a much more rapid rate of promotion. The fully equipped banker must understand accounting and most of the problems on the financial side of all forms of business. His success in placing loans and insuring their safety depends upon such knowledge. No matter what the training, however, the person entering the banking profession is usually required to start at the bottom. The promotional chart, page 174,

taken from the work previously quoted shows the points of entrance and lines of promotion in a bank up to officers who are appointed by the Board of Directors.

The person desiring to enter banking can do so through any of the positions marked on the chart with a star. He most frequently enters as a **page** or **office boy**. His duties are carrying communications of all kinds, handling the mail, operating pneumatic tubes, buzzers, and telephones, according to the equipment of the bank, caring for certain equipment, filing and finding information, and performing simple clerical work. In addition to these duties his principal work will be running a large number of errands, taking messages, etc., to all departments of the bank and to all the business houses with which the bank has relations. These duties give him an opportunity to come in contact with all branches of the banking business, and the rapidity with which he learns depends upon his powers of observation and the use he makes of his leisure in studying the banking business.

He will generally be advanced to the position of **bank messenger** or **collector** where he is given greater responsibility and comes into closer relations with the bank's business associates and has a greater opportunity for learning the details. From here on the lines of promotion are shown on the chart, and the rate of advance will depend upon native ability plus application to the study of the science of banking. This study may be done through correspondence work, in evening schools, and very often in special classes conducted by the banks.

#### **146. Bookkeepers in banking**

There is another line of entrance that may avoid some of these lower steps, and that is to the position of **book-**



**keeper**, who stands in a "key" position on the promotional chart. A large portion of the work in a bank deals with bookkeeping and accountancy. The person who has fitted himself by a course in Accounting with special emphasis on bank problems may often enter this position in the beginning.\* He will, however, find promotion slow unless he immediately sets about studying all phases of the banking business. He will also have fewer opportunities for getting this information by observation, as he is more closely tied to his own duties.

There are certain personal qualifications for banking. There must be good personal appearance and a willingness to study outside of business hours, which are always much longer than the so-called "banking hours" during which the doors of the bank are open to the public. One qualification which is fundamental is absolute integrity. The foundation of the banking business is confidence, and the person who fails in this regard is lost forever in banking.

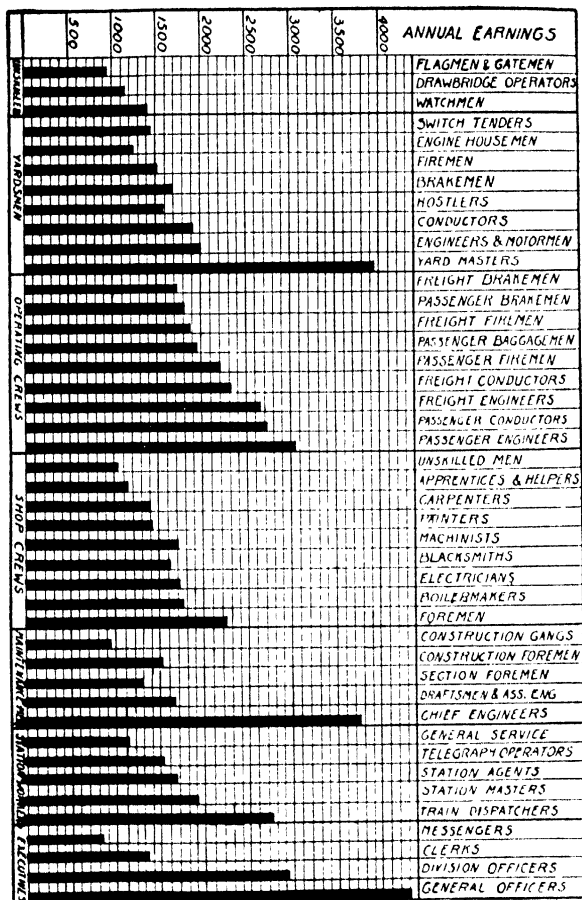
Wages paid vary greatly. In the junior positions they are not much higher, if any, than for clerks, messenger boys, etc., outside. They rise quite rapidly toward higher positions, and when the top is reached are equal to the highest salaries paid in any business.

Banking is coming to be more and more closely connected with the direct management of business. So much of the financing of a large corporation is conducted through the banks, and the safety and prosperity of the banks are so tightly bound up with the success of business that a banker must have a close and intimate knowledge of business management.

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\* See p. 121

The decision concerning credit so frequently depends upon the banker's judgment of the probability of industrial or commercial success that he must know all the factors which make up business efficiency. In many cases loans are extended only after an investigation that includes, not simply assets, markets, manufacturing costs, etc., but also the probable relations of the management to its employees, the skill of the managers in marketing their products, and all other elements of good management.



Earnings of Railroad Employees in 1919  
From "Railroading as a Career" by E. W. Weaver.

## CHAPTER X

### Transportation

#### 147. Function of transportation

Production, the political economists tell us, consists in adding form, time, and place utilities to raw materials. Goods are not finished until they are in the proper form and place at the time they are wanted by a consumer.

Manufacturing is concerned mostly with changing the forms of articles; transportation gives them their proper place utility, and the mercantile industries are largely occupied in seeing that things are ready at the time they are wanted.

Nowhere is transportation so important as in the United States. The great distances and wide variations in climate, resources, and population have made necessary more miles of railroads, both steam and electric, and more automobiles and trucks than are found in any other nation.

The transportation industry is so widespread and diversified that there are a multitude of different entrances and lines of promotion. It is really a whole collection of occupations, with many classes having little in common.

Steam railroading is still the largest as well as the oldest branch of transportation. The running of a railroad is divided among several departments.

#### 148. Railroad organization

In a study of steam railroad operation made by the Division of Vocational Education of the University of California, the industry is analyzed as follows:

A railroad company, like other corporations, is owned by its stockholders, often numbering as many as fifty thousand, who elect a Board of Directors to control the corporation for them. The Board of Directors in turn elects a president, various vice-presidents, a secretary, a treasurer, a general auditor, and a legal counselor.

The special part of the railroad organization which is concerned directly with transportation is divided into two large departments, the Operating Department and the Traffic Department, each of which is divided into several branches for purposes of efficient administration.

The Operating Department, under the general manager, has various subsidiary departments. The Roadway Department, one of these subsidiary departments, provides and maintains in good condition the roadway and all physical property connected with the line. The Machinery Department, another branch department, provides and maintains locomotives and cars for traffic. The Transportation Department performs the work of moving passengers and freight.

The Traffic Department conducts the financial and business affairs of the railroad company. It classifies traffic, determines charges, handles claims of passengers and shippers, solicits business, and endeavors to increase the traffic and earnings of the company. This work is under the supervision of a freight traffic manager, a passenger traffic manager, and a mail traffic manager. The first two of these officials are assisted by a general freight agent and a general passenger agent, respectively.

A railroad requires a great variety of supplies for the operation and maintenance of its trains, roads, and other physical property. For the purchase and distribution of these supplies it has a Purchasing Department, in charge of a purchasing agent. Under the purchasing agent are a general storekeeper and various district storekeepers, who keep the supplies of the railroad and distribute them upon the presentation of properly authorized requisitions.

Under the auditor are four departments in charge of the following officials, the auditor of freight accounts, the auditor of passenger accounts, the auditor of disbursement accounts, and the auditor of miscellaneous accounts, whose duties are indicated by their titles.

### 149. Wandering instinct

Although it is possible to be employed in the office or shops of a railroad without frequent changes of residence, it is generally true that the employe must be prepared to travel considerably.

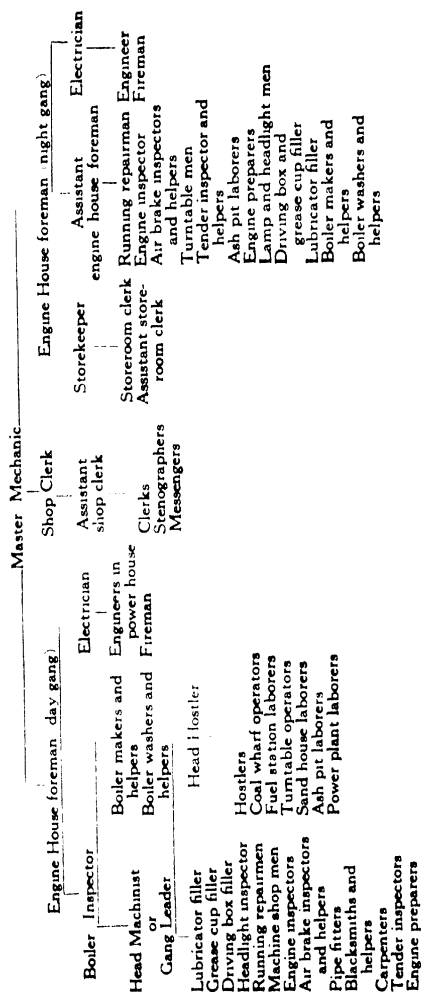
There is one instinct that is highly developed in a large section of the population which finds a special gratification in this field. This is the nomadic or wandering instinct. Many people find it uncomfortable to remain long in one place. This is especially true of Americans, made up as they are of families all of whom at some stage in their existence took the long journey from some other nation to the United States. In many occupations this instinct is a handicap and the person in whom it is highly developed should, unless he is certain he can conquer it, select an occupation in which it will be of value.

Since the railroads are vast machines made up of many machines, railroad employment calls for the mental qualifications already described or required for entrance into the machinist's trade. For the higher stages in transportation there is need of the talent for leadership, organization, and management.

The office work of a railroad is in some departments much the same as is to be found in every industry. It has bookkeepers, typists, file clerks, and other workers of the kind already described in discussing the commercial field.

The lines of promotion are the same, with this exception, that early in the upward progress there is great need for special knowledge of transportation problems. The person who enters the clerical field in railroading with the hope of rising should at once begin a thorough study of the intricate systems of organization by which a modern

## Positions and Lines of Promotion in Railroad Shop



railroad is managed. He should know the relation of the various departments, select the one in which he wishes to specialize, and study its every detail in the many books that are available for the purpose.

### 150. Telegraphy

There is another field of clerical work peculiar to railroading. One branch of this is telegraphy. In addition to a good common school and preferably a high school education, a peculiar manual dexterity is required. Only a small percentage who enter this trade ever become expert telegraphers. No matter how faithfully they try or how long they work there is a limit of speed which they are unable to exceed, and this limit is just below the point where the best salaries are paid. It is possible, by means of tests of mental reactions, to find out almost as accurately in a few moments whether there is a possibility of success as by the long and costly method of experience. Any person who thinks of entering this trade should not do so until he has tested himself by these methods.

The telegrapher also needs to be careful, accurate, and have a good memory. This trade sometimes leads from railroad into commercial telegraphy, which usually requires the learning of some of the codes by which matter is sent at a far greater speed than when complete words and sentences are used. The railroad telegrapher is on the direct line of promotion to **train dispatcher**, where he has the full responsibility for routing trains. This position is one that calls for nerves of steel, quick and certain judgment, and a willingness to assume and bear responsibility. Success in the position of train dispatcher leads to that of **chief dispatcher**, who has charge over the general handling of trains on large sections of road. Both of these positions



in some instances lead into the highest managerial positions. Preparation for this line of promotion demands thorough study of all phases of railroad management and administration.

### 151. Duties of station agent

Another line of promotion for telegraphers leads through the position of **station agent**. In the smaller towns this involves a mass of miscellaneous duties including the handling of freight, baggage, express, passengers, the keeping of books about all these, and responsibility for the financial transactions involved. Promotion is from the smaller to the larger cities and to the position of **station master** in some large railroad center. Before this position is reached, the candidate for promotion must have had long training in the practical work of railroading; he must be thoroughly familiar with freight and passenger rates, also with the handling of men and with the general principles of railroad management and administration.

Railroad shop work is at the bottom very much like any other mechanical trade and much of what has been said concerning machinists applies to workers in this department. There must, in addition, be special study of the handling of railroad equipment, particularly of air brakes, locomotive boilers and engines, and such electrical apparatus as is used on trains and in signals, and all phases of car construction. The lines of promotion are practically the same as in the mechanical trades.\*

The third division of transportation is concerned with the care of the track. It is largely unskilled work, consisting in the laying of new track and the care of old track, involving the trades of **linemen, repairers, painters,**

\* See pp 140-150

**carpenters, and concrete workers.** In most cases very little skill in any of these trades is required. Almost the only possibility of promotion is to the position of foreman of construction gangs. Even for this purpose there is a tendency to take men who have had some preparation along civil engineering lines.

### 152. Danger of accident

The fourth and largest field of operation is that concerned directly with the handling of trains. In this group are the **engineers, firemen, baggagemen, porters, brakemen, conductors, and switchmen.** The qualifications for this work are rather high and are usually determined by careful examinations. There must be a good physical foundation including not only considerable muscular strength but sound senses. Eyesight and hearing are thoroughly tested before employment. There must always be a willingness to travel, often to be away from home a large portion of the time. There are few industries in which the lines of promotion are more firmly fixed. They are generally a part of the agreements between the unions and the employers. Where they are not so fixed, custom has made them almost equally binding. The **freight brakeman** advances from a local to a through-freight. He is engaged in one of the most dangerous occupations in the world, exceeded in this quality in railroading only by that of the switchman. In spite of the great advances that have been made in mechanical appliances and safety regulations, the death rate in this trade is still higher than in that of all but a few divisions of the American Army in the Great War.

From the position of through-freight brakeman there are two lines of promotion. One is to that of **freight con-**

**ductor**, who has charge of the general running of a freight train and from which position he may expect in time to be promoted to **passenger conductor**. The other line of promotion is from the position of freight to **passenger brakeman**. The latter position, however, is somewhat of a dead-end job from which there is seldom any promotion to any other position.

The **fireman** sometimes starts as a **hostler** in a round-house where the engines are stored, cleaning and caring for them. When he becomes a fireman, he takes up a job that calls for great physical endurance. He must shovel many tons of coal daily, and at the same time keep watch of the water level, the steam pressure, and many other details about the engine. He must use all his leisure time in studying the duties of an engineer, particularly air-brake practice. After a certain number of years he may expect to be promoted to the position of **engineer**.

His first position will be on a freight engine from which in time he may be fortunate enough to be given charge of a passenger run, and he attains the highest position for which he can usually hope when he pulls the throttle on one of the great special passenger trains. While the position of engineer does not lead directly to as high positions as some others, it is in itself a well-paid position with many desirable features. In fact, it has been selected by Herman Schneider of the University of Cincinnati "as one hundred per cent work" because it has the following desirable elements:

1. It is done in the open air.
2. It provides a well-rounded physical development.
3. The constant improvements in locomotive design and in railroad appliances require continuous mental development.
4. Mental alertness is constantly required for emergencies.

5. A comprehensive grasp of the whole interdependent scheme of production (a railroad produces transportation) is essential.
6. The conditions under which the same run is made are never alike.
7. The work itself—not lectures or preachments or popular acclaim—breeds in the engineer the highest quality of good citizenship, namely, an instant willingness to sacrifice himself for the lives in the train behind him.

The occupations of **switchman** and **baggage**man seldom offer much opportunity for promotion and call for little more than great physical strength. As already stated, switching is one of the most dangerous occupations of modern industry.

Nearly all the details of these systems of promotion are fixed and often the rules demand that seniority shall be observed, which leaves little room for individual effort.

### 153. Rate of promotion

While promotion in the railroad industry is fixed according to strict rules, it comes only by great effort. There is an average of twenty-five firemen seeking the position of each vacancy as engineer. The same proportion, with no great variation, holds true in other lines of promotion, and indeed, throughout the entire industrial world. This means that there is keen competition for each of the higher positions. It means that those who secure them must put in a great deal of time, outside of working hours, in preparation for the expected raise. This is so thoroughly recognized in the railroad industry that elaborate systems of education are already in existence and are made use of by those who gain the coveted positions. These consist, in part, of regular evening courses at division points, of technical books, of articles in trade magazines, and specially of correspondence

courses. Railroad men have long been noted as among the largest patrons of correspondence school work. The thorough training thus given accounts in no small degree for the high average of wages, even in those occupations that are attained by the great majority of employes as well as in the higher positions. All put brains into their work and this always commands money.

Practically every railroad official in the United States today rose from the ranks. The peculiar thing is that a study of these positions shows that there is no fixed line of advancement or no special starting point. It would be hard to name an occupation from which some such official did not start, and the routes of advancement are almost as various as the individuals. Some rose steadily within the same system by the regular routes of promotion; some changed roads frequently; and many changed departments within the railroad system. This emphasizes a point frequently mentioned that every person has before him at any time a large number of choices, and that success depends upon wisdom in making the selection and diligence in pressing along the chosen road.

#### **154. Technical training needed**

While the past proves that men with little technical training have been able to rise to the very highest positions, the directors of railroads are tending more and more to look for the highly trained engineer when selecting men for executive positions. There are more high-salaried positions in the railroad service than in any other industry and every year sees more of these filled with men who studied civil and mechanical engineering and then added to this knowledge special study and experience along railroad lines.

E. W. Weaver, who prepared the chart of wages on p. 180, says:

In spite of the fact that the old type of railroad executive feigns a contempt for education as a qualification for success, railroading pays the educated man a very high premium.

Turning again to the chart of average annual earnings of all the employes of the large companies of the country, you will notice that the laboring man who begins at about eighteen and is good for an average of forty years of service under ordinary circumstances, earns during his lifetime between \$40,000 and \$45,000, while if the same man had taken a year in a school of telegraphy, he would during his probable earning years have earned a total of nearly \$65,000, or in other words, the year in training would have added to his income-producing capacity approximately \$20,000. If this same laboring man had served a regular apprenticeship at a skilled trade, he would probably have been good for just as many years of active work, but his total earnings according to these returns would have been nearly \$70,000 for a machinist, making the value of his trade to him approximately \$25,000. If he had finished high school and secured practical experience as an electrician, his value over that of the untrained laborer in this same market would approximate \$25,000.

In railroading, as in every other department of modern industry, the standards, even for admission, are constantly rising. Most of the present railroad employes have only a common school education, but there is a tendency to select men with technical training for the higher positions even though they may have had much less experience. The young man who will travel through express over the lines of railroad promotion in the future will be the one who buys an educational ticket at some good technical high school, or who prepares himself by study of technical courses before he takes his first position, or who speeds up his progress with systematic work by correspondence after he starts.

## **Electric Railroads**

### **155. Changes coming**

Electricity has worked some great changes in transportation. The only field in which change has been more rapid is in the closely allied one of the use of the automobile. In many places it now looks as though electricity might supplant steam as the method of moving trains over all railroads. The Chicago, Milwaukee, and St. Paul has already electrified long stretches of its track across the Rocky Mountains. A much more extensive project is the one that proposes to link up all the power stations in the northeastern section of this country, and simultaneously to electrify all the railroads in this most thickly settled division.

During the World War, British engineers prepared a plan which is still under consideration by the Government to electrify all industries in the British Isles. This was to be accomplished by building power stations at the mines and prohibiting the shipment of coal for domestic use. While such sweeping proposals are still in the projected state, the actual mileage of electrically operated railroads is increasing daily and with it the field for employment.

Electric railroading falls into two divisions—that of the operation of street cars in the larger cities, and of the longer interurban routes. The preparation and the lines of promotion within these two, however, are so much alike that they can be treated together.

The Indianapolis Survey describes the work of employees in electric railroading as follows: "The occupations in a descending scale of importance are those of the following employees: Superintendent; assistant superintendent; division inspector; instructor, motorman, and

conductor; station foreman; assistant station foreman; car shifter; and car-shifter helper."

The **superintendent** and his assistant employ the platform men, make promotions, and make recommendations to the management relating to wage scales, social betterment, and other matters pertaining to the department.

The **division inspector** has charge of the cars and crews while on the road. It is his specific duty to hold men to the observance of rules; to check up the efficiency of motormen in handling cars and car equipment; to keep cars on their scheduled time throughout the entire length of their routes, etc. He also represents the company in a great many other ways. He must be a man of matured judgment, tactful in handling disputes with passengers, and thoroughly informed as regards the utilization and the defects of car equipment.

The **instructor** teaches motormen and conductors their duties and is generally a man who has been promoted from one of these positions.

The **station foreman** dispatches cars on their runs and attends to the extra list, arranging for crews as necessary.

The **conductor** collects fares and is responsible for starting and stopping signals, backing the car, handling crowds, assisting aged and infirm persons, and calling the streets.

The **motorman** has charge of the mechanical operation of the car and is obliged to keep to a schedule throughout his line. The position calls for good judgment, quick muscular reaction to the senses of sight and hearing, and a certain small amount of mechanical dexterity. Most of the motormen and conductors are recruited from farmer boys. Their hours are usually long and training for the position slight.



## **Automotive Transportation**

### **156. Highway transportation**

Many engineers think that the automobile will bring about as great changes in transportation as were caused by steam or electricity. They believe that the great flexibility of the auto truck and the passenger car will make up for the larger loads that can be pulled on the tracks. They also call attention to the fact that the roadbed is built and maintained by the public with only a comparatively small license fee charged to the carrier. Moreover, since automobile engineering is still very young, it is quite sure that improvements will continue to be rapid for some years to come.

The beginnings of a new system of transportation are already in evidence in the large cities. Auto trucks are now leading out from every large city, not only to the suburbs, but are forming regular transportation lines of ever-increasing length. Some who have made a close study of this problem believe they see the beginnings of a national system of auto trucks, consisting of great fleets of vehicles that can be shifted from place to place as the demand for freight changes. If this prediction is correct, there will be a great field for engineers, organizers, and managers of the new method of transportation. It is going to call for new kinds of knowledge, dealing not only with the regular problems of management, such as are found on electrical and steam roads, but with new systems of cost-keeping for trucks and methods of routing over public roads which will require accurate information as to road conditions over a wide extent of territory. At the present time, however, the field of automobile traction is

more restricted. It has two important phases—those of driver and mechanic.

The occupation of *chauffeur*, whether public or private, is one which offers a fairly good immediate reward, many pleasant conditions of work, but practically no opportunity for direct promotion. There is frequently much leisure time, and such jobs are often sought by students in universities as means of earning a living while studying. There is certainly no reason why any person who already occupies the position should not make as good use of it. He has already something of a start in mechanics or else he would not be holding the position. With this trade capital, he can build an intellectual foundation from which he can step into other more desirable occupations.

The mechanical side of automobile work divides into repair and construction. Construction work in the factory is in no important way different from that in any other machine shop and has already been treated under that head. Repair work on automobiles, unlike that in steam and electric transportation, is done in small shops. The automobile repairer combines the work of mechanic and manager of his own business with that of merchant in automobile supplies. This is a trade that can be learned by a study of automobile courses with experience as assistant in a garage. There is no regular line of promotion except in some of the larger shops where there are foremen, and the top of the ladder is that of owner and manager of a shop. For this a business training is as essential as mechanical skill.\*

\* See pp. 206-208.



## CHAPTER XI

### Building Trades

#### 157. Better homes

Next to food in man's needs comes shelter. In the temperate zones modern man, at least, cannot live without some sort of covering. As the years pass, the form of this shelter grows more elaborate. The family of Abraham Lincoln spent a winter in a rude "lean-to" log cabin with a fire as the only wall on one side. Their lot was rather a common one for thousands of pioneers. From this to the single-room log cabin was an advance. Each year sees the standard of shelter higher. The long rows of monotonously uniform mining shacks, which employers once built for their workers, are giving place to "garden cities" and handsomely laid-out villages with artistically diversified homes. For the city dweller the change is even more striking. While a modern flat may sometimes be almost as crowded as the pioneer's cabin, it contains a mass of "built-in" labor-saving devices undreamed of by our fathers.

Like every other trade, that of building has become more and more specialized, until there are now twenty-six trades listed in the accompanying wage table.

New fields of building have become of great importance. Until within the last century mankind did almost all of its work out-of-doors or in its homes. The industrial revolution with power-driven machinery for the first time brought great bodies of men and women together to work in large structures. As cities grew up about the new forms of manufacture, as warehouses became neces-

# Wage Scales in the Building Trades

## Compiled by The National Association of Builders' Exchanges and Prevailing September 30, 1921.

	Carpenters	Cement Finishers	Electricians	Hood Carriers	Laborers	Lathers	Painters	Plasterers	Plasterers' Helpers
Atlanta, Ga	70	90	1 00	30 40	.15 25 30	.90 1 00	50 60	90	30
Baltimore, Md	80	1 00	1 00	75 40	.40 .25	1 00	87½	1 25	.75 45
Buffalo, N. Y	80	80	90	50	.40 55	1 00	75	1 00	60
Boston, Mass	90	90	90	60	.60	.90	90	90	70
Chicago, Ill	†	85	1 10	72½	72½	1 00	†	†	.78½
Cincinnati, Ohio	1 00	90		85	45	1 00	87½	1 12½	.85
Cleveland, Ohio	1 04	1 04	1 10	60	57½	1 04	93	1 04	60
Columbia, S C	45 60	45 60	1 00	25	20	per M	50 60	75	.25
Des Moines, Iowa	92	90	75	65			80	1 11½	
Detroit, Mich *	80	70	87½	45 60 67½	50 15 50	1 00	80	1 00	.75 55 65
Duluth, Minn	80	80	80	70	.35	.90	80	1 00	.70
Indianapolis, Ind	92½	90	1 00	70	30 40	1 25	90 7 00	1 12	
Little Rock, Ark	80	1 00	92	40	30		90	1 12	
Los Angeles, Cal (rate per day)	7 00 8 00	8 00	8 00	9 00	5 00	8 00	9 00	10 00	9 00
Louisville, Ky	80 60 80	1 00 60 80	87½	80	40	day	87½	1 12½	80
Memphis, Tenn	80	80	80	62½	25 40	1 00	87½	1 12½	.62½
Milwaukee, Wis	85	65	1 00	65	up	1 00	85	1 12½	
New York, N Y	1 12½	1 12½	1 12½	87½	81½	1 12½	1 12½	1 25	.93½
Norfolk, Va	65 75	50 65	65 75	50 60	50 35	87½ 75	65 75	87½ 1 00	.50 60
Day rates	7 00	8 00	7 00			8 00	7 00	9 00	
Oklahoma City, Okla	75				40				
Omaha, Nebr	1 00	1 00	1 12½	60	50 50 60	1 00	1 00	1 25	65
Philadelphia, Pa	90	80	90	75	60	90	80	1 00	80
Pittsburgh, Pa	1 00	87½	1 00	80	90	1 12½	1 12½	1 25	.40
Raleigh, N C	60	75	1 00	30	25	50	50	.80	
Richmond, Va	72½	50	40	25	30	75	75	82½	.50
Rochester, N. Y	1 00	1 25	1 10	65	65 25	90	1 00 6 00	1 25 6 00	
Savannah, Ga	80	50	75	30	30	day	day	day	
St. Louis, Mo	1 25	1 25	1 25	85 62½	67½ 15	1 25	1 25	1 37½	.85 62½
Washington, D C	1 05	1 00	1 06½	75	50	1 12½	1 00	1 25	.75

NOTE: Where two figures are shown they are the minimum and maximum wages paid. All figures are for hour rates except where otherwise indicated.

\*Detroit wage scales reported by E. F. Hascall, secretary Builders' and Traders' Exchange.

†Chicago carpenters, painters, plasterers, elevator constructors, and sheet metal not in arbitration; old scale \$1 25. All scales reported for Chicago from Judge Landis, September 7, 1921, decision.

Courtesy, The Building Age, November, 1921.

# Wage Scales in the Building Trades

## Compiled by the National Association of Builders' Exchanges and Prevailing September 30, 1921

	Plumbers	Rodgers	Sheet Metal	Steam Fitters	Steam Fitters' Helpers	Stone Cutters	Structural Iron	Tile Setters
Atlanta, Ga	1.00	.80 90	1.00	1.00	40	1.00	.90 1.00	1.00
Baltimore, Md	1.00	.75 1.00	.70 90	1.00	75	1.00	.90 1.00	1.00
Buffalo, N. Y.	1.00	.40 1.00	.87 <sup>1</sup> <sub>2</sub>	.90	20 40	1.00	1.00	.85
Boston, Mass	.90	.90 92 <sup>1</sup> <sub>2</sub>	.90	.90	60	.90	.90	.90
Chicago, Ill	.95	1.00 70	1	.95		1.02 <sup>1</sup> <sub>2</sub>	1.05	1.02 <sup>1</sup> <sub>2</sub>
Cincinnati, Ohio	1.00	1.00 81	.80	1.00	60	1.15	.90	1.00
Cleveland, Ohio	1.10	1.04	1.04	1.04	62 <sup>1</sup> <sub>4</sub>	1.04	1.04	.90
Columbus, S. C.	1.25	.90	.90	1.25	50	1.00	.80	1.00
Des Moines, Iowa	1.25		.93 <sup>1</sup> <sub>4</sub>	1.25			.90 90	
Detroit, Mich *	1.00	.65	.80	1.00	60 50	.90	1.00	
Duluth, Minn	.80	.75	.80	.80	75	1.00	.80	1.00
Indianapolis, Ind	1.15	.60 70	.92 <sup>1</sup> <sub>2</sub>	1.15	65	1.00	1.15	1.00
Little Rock, Ark	1.00	.70	1.00	1.25		1.00	.87	1.00
Los Angeles, Cal (rate per day)	1.25	.90 7.00	1.00	1.25				
Louisville, Ky	9.00	8.00	8.00	9.00	7.00		8.00	8.00
Memphis, Tenn	1.00	.80	.80	1.12 <sup>1</sup> <sub>2</sub>			.90 75	
Milwaukee, Wis	1.12 <sup>1</sup> <sub>2</sub>	.40 75	.87 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>	50	1.00	1.00	1.00
New York, N. Y.	1.00	.75 90	.87 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>	57 <sup>1</sup> <sub>2</sub>	.90	1.12 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>
Norfolk, Va	1.12 <sup>1</sup> <sub>2</sub>	.75 87 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>	87 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>	.75 85	
Oklahoma City, Okla	1.00	.87 <sup>1</sup> <sub>2</sub>	.87 <sup>1</sup> <sub>2</sub>	1.00		1.00		
Omaha, Neb	6.00	7.00						9.00
Philadelphia, Pa	1.25	1.12 <sup>1</sup> <sub>2</sub>	1.25			1.12 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>	1.00
Pittsburgh, Pa	1.25	1.12 <sup>1</sup> <sub>2</sub>	1.25			1.12 <sup>1</sup> <sub>2</sub>	1.12 <sup>1</sup> <sub>2</sub>	1.00
Raleigh, N. C.	.90	.90	.90	.90	75	.90	.90	.80
Richmond, Va	1.00	1.00	1.00	1.00	60	1.00	1.00	1.00
Rochester, N. Y.	.90	.60	.60	1.00				1.10
Savannah, Ga	.85	.65	.75	.90	50	.85	.85	.85
St. Louis, Mo	.95	.75	.75	.90	50	1.00	1.00	1.00
Washington, D. C.	1.10	.90	1.00	1.10	2.80-3.80 day	1.00	1.25	1.00
	1.00	.75	.87 <sup>1</sup> <sub>2</sub>			1.00	.80	1.00
	1.00	1.00	1.25	1.25	75	72 <sup>1</sup> <sub>2</sub>	1.25	1.00
	.60							
	1.06 <sup>1</sup> <sub>4</sub>	1.15	1.00	1.06 <sup>1</sup> <sub>4</sub>	.65	1.00	1.25	1.00

Notes: Where two figures are shown they are the minimum and maximum wages paid. All figures are for hour rates except where otherwise indicated.

\*Detroit wage scales reported by E. F. Hascall, secretary Builders' and Traders' Exchange.  
 †Chicago carpenters, painters, plasterers, elevator constructors, and sheet metal not in arbitration, old scale \$1.25. All scales reported for Chicago from Judge Landis, September 7, 1921, decision.

# Wage Scales in the Building Trades

## Compiled by The National Association of Builders' Exchanges and Prevailing September 30, 1921.

	Bricklayers	Elevator Constructors	Gas Fitters	Hoisting Engineers	Marble Cutters	Marble Setters	Masons	Ornamental Iron	Pipe Coverers
Atlanta, Ga. . .	.90	1.00	.75 1.00			1.00	.90 1.00	.90 1.00	.80 90
Baltimore, Md. . . . .	1.25	1.00	1.00	.90 1.00	1.00	1.00	1.25	1.00	1.00
Buffalo, N. Y. . . . .	1.00	.97½	.90	1.00	1.00	1.00	1.00	.75	1.00
Boston, Mass. . . . .	.90	.90	.90	.90 .85	.90	.90	.90	.90	.90
Chicago, Ill. . . . .	1.10	†	.95	1.10		.87½		.95	.95
Cincinnati, Ohio . . .	1.25	1.00	1.00	1.12½	1.06	1.06	.90	.90	.95
Cleveland, Ohio . . .	1.04 .75	1.06¼		1.04 .60 .75	1.06¼	1.06¼	1.04	1.04 .70 .80	.93 1.25
Columbia, S. C. . . .			.60		1.00	1.25	1.25		1.25
Des Moines, Iowa . . .	1.11½			.90					1.25
Detroit, Mich. * . . .	1.00	1.00			.80	1.00	1.00		.93½
Duluth, Minn. . . . .	1.00		.80	.65 .80 .92½		1.00	.80	.80	.80
Indianapolis, Ind. . .	1.15	1.00	1.15	1.15	.65	1.00	1.15	1.15	.80
Little Rock, Ark. . . .	1.00		1.00		1.00	1.00	1.00		
Los Angeles, Cal. (rate per day) . . . .	10.00	7.00	9.00	8.00	8.00	8.00	10.00	8.00	8.00
Louisville, Ky. . . . .	1.25		1.00	.75				.75	
Memphis, Tenn. . . .	1.12½	.95		1.00	1.00	1.00	1.12½	1.00	.60
Milwaukee, Wis. . . .	1.00	1.00	1.00	1.00	.90	1.06¼	1.00	1.00	.85
New York, N. Y. . . .	1.25	1.12½	1.12½	1.25	1.12½	1.12½	1.25	1.12½	1.12½
Norfolk, Va. . . . .	1.12½						1.12½	.85	
Oklahoma City, Okla. .	.90			7.00		8.50			
Omaha, Nebr. . . . .	1.12½		1.25	1.25	1.00	1.00	1.12½	1.12½	1.25
Philadelphia, Pa. . . .	1.00	.90	.90	.90	.80	.80	1.00	.90	.80
Pittsburgh, Pa. . . .	1.12½ .80	1.00	1.00	1.00	1.06¼	1.06¼	1.00	1.00	
Raleigh, N. C. . . . .									
Richmond, Va. . . . .	.87½	.85	.85					.85	
Richmond, Va. . . . .	1.00	.90	.90	.90	1.00	1.00	1.00	.95	
Rochester, N. Y. . . .	1.25	1.00	1.10	45.48 week	1.00	1.00	1.25	1.25	1.00
Savannah, Ga. . . . .	.87½					1.00			
St. Louis, Mo. . . . .	1.25	1.25	1.00	1.25 1.37½	1.06¼	.72½	1.00	1.25	1.25
Washington, D. C. . .	1.25	1.25	1.06¼	1.00	1.00	1.12½	1.12½	1.25	1.00

NOTE: Where two figures are shown they are the minimum and maximum wages paid. All figures are for hour rates except where otherwise indicated.

\*Detroit wage scales reported by E. F. Hascall, secretary Builders' and Traders' Exchange.

†Chicago carpenters, painters, plasterers, elevator constructors, and sheet metal not in arbitration; old scale \$1.25. All scales reported for Chicago from Judge Landis, September 7, 1921, decision.

sary for storage and mammoth stores for the distribution of goods to those who were so far separated from the sources of production, a wide new field for building was created. Today, stores, factories, hotels, garages, amusement enterprises, etc., absorb a vast share of the building energy of a nation.

The close of the Great War found all building far behind the demand. Different authorities estimated that the United States needed to construct between five billion and twenty billion dollars' worth of homes and factories to catch up with the growth which would have come had the War not intervened. This means that for some time to come the demand for labor and building will be great.

There are certain general characteristics of the building trades. Most of them are quite largely seasonal in character, at least in the northern states. Excavating and exterior work cannot be done without extraordinary expense, except during the summer months. All the other building workers must, to some extent, wait upon the laying of foundations and erecting of walls. Their work is, therefore, also seasonal. On the other hand, the wages paid in the building trades are supposed to compensate for this to some extent by being higher than those paid in other trades requiring about the same amount of preparation but in which the work is more regular.

The accompanying table of wages paid in the building trades, while subject to continuous changes, will give a fairly correct idea of what may be expected in any section of the country. Wages are calculated by the hour, with an eight-hour day, and are paid weekly or at the completion of the job. Wages and many of the detailed conditions of work are fixed in most cities by agreements with the unions.



### **158. Moving from job to job**

Only those building crafts employed in woodworking and other shops, where an increasing number of parts used in building are made according to standard designs or to specifications furnished by the architect, have any regular fixed work place. Other workmen must move from job to job as they do their special task upon a building. Consequently there will be many times, particularly in large cities, when long journeys in crowded street cars will be necessary each night and morning. There is little opportunity to make permanent friends on the job or to build up that "plant spirit" with its social organization that is now so common in the best manufacturing industries. On the other hand, the association in the unions may be close and continuous through many years.

There is no unchanging monotony in the building trades, since the work is never quite the same in content and surroundings. Much of the work is out of doors, practically all of it is under good conditions of ventilation. The expectation of life is long and the period of productive labor lasts later than in most other industries, with considerable opportunity to work on at somewhat reduced rates after old age has made its appearance. In some branches, particularly that of the structural iron workers, the accident rate is high, but the "safety first" movement is insisting upon many precautions and safeguards, unknown to a previous generation, and these are constantly reducing the percentage of accidents.

No one intentionally chooses a dying occupation. It would not be wise for many people to become harness makers or carriage builders when the automobile trade is driving these trades into the field of tradition. There is no danger that the general building industry will decline.

It is growing in importance each year. But it is changing rapidly in many branches. Concrete and iron are displacing wood and brick and changing the character of the work to be done. Wood-working machinery is invading many branches of the carpenter's trade. Metal lath and stucco work are transforming the occupations of lather and plasterer, and affecting that of the mason. These changes are of much more importance in some localities than in others. Before taking up any branch of the building industry, specially a highly differentiated one, it is best to talk with some contractor of the locality and find out how recent trends in construction are affecting the trade.

### **159. Learning the trades**

Nearly all the building trades were formerly learned by the apprenticeship method. The union agreement generally contains rules as to the number of apprentices permitted, their wages, and stipulations as to the education they must be given. In many localities, trade schools give much help. In the smaller towns the trades of carpenter, mason, and plasterer are still sometimes learned by the "picking up" process. A boy who is "handy with tools" is permitted to "try his hand" on various jobs of increasing difficulty until he is able at least to hold a job at the trade. The young man who is intending to enter any of the building trades should not stop with the grade school. If possible, he should try to attend some manual training or technical high school where he can get the necessary educational foundation. Without such a foundation he will be handicapped throughout life or be compelled to carry extra heavy study in addition to his daily work at his trade. In a survey of the building trades in

Richmond, Virginia, employers were asked as to the most common deficiency and answered almost unanimously: "Deficiency in general education," usually adding, "in drawing and mathematics of the trade."

There is one form of training that is valuable in nearly every trade but specially in building. This is education in those principles that determine beauty in the product. All things are purchased because they satisfy some or all of the senses of a consumer. It is not enough that a building merely relieves the sense of temperature—of discomfort by sheltering from extremes of climate. More and more we are demanding that, both inside and outside, it must satisfy the sense of sight, the ideals of beauty. The man who has a knowledge of the principles of art and design, of the arrangement and proportions of lines and materials so as to make the result agree with good taste, has a long start over all those who lack this knowledge and access to many lines of promotion that would otherwise be barred.

All workers in the building trades have frequent and urgent need for mathematics. They should know how to estimate jobs and to calculate, according to special trade rules, the dimensions of lumber, shingles, brick, stone, concrete, and iron. The ability to read blueprints is essential in many lines and the ability to make drawings is a great help in seeking promotion.

### **160. Types of jobs**

The class of unskilled manual workers is very large in the building trades. These are the men who excavate the foundations, mix the mortar, carry stone and other material to the craftsman, and, in general, do the hardest and poorest paid work. These are the men who do not

choose an occupation and prepare themselves for it. Necessity drove them into the work, usually without education, and always without special training; their lives are the shortest, their labor the hardest, their services the least in demand, and in every way their position is the least desirable of any of the millions of workers engaged in building.

The next type above these is that of the skilled craftsmen, such as carpenters, masons, lathers, sheet-metal workers, structural iron workers, and the whole long list of tradesmen named in the accompanying table. There are usually many grades of skill among these men. There are some who picked up their trade here and there and who are never hired except when the demand for labor is greatest. Most of these have not completed even a common school education. They cannot work from drawings, and they require constant supervision. They have no hope of promotion as long as they confine their training to what can be picked up on the job.

Above these comes the craftsman who has had his apprenticeship after at least a common, and preferably a high school course. He knows how to care for his tools. He can perform a large variety of jobs within the trade. He can read blueprints, make rough drawings, carry out ideas that are only suggested to him, go ahead with a job if the boss is not at hand, and needs very little supervision at any time. In every field it is the man with just that little extra knowledge which enables him to respond when an emergency arises and to do the unaccustomed job who obtains steady work, gets a trifle the highest wages, and is the first to be promoted.

Always these same three elements of quantity, quality, and variety of ability are the test of survival in the strug-

gle. It is from those who possess these qualities that men are recruited, by the help of additional training, to the ranks of foremen, contractors, architects, and engineers.

### 161. Two roads up

There are two lines of immediate promotion in practically every one of the building trades to **foreman** and to **contractor**. Nearly every worker at the trade hopes to enter one of these positions. The foremanship usually goes to the fastest and best all-around worker on the job, and is usually looked upon as calling for only a "little more" of the skill of the same kind that is needed by the journeyman. It calls for this, and it also calls for something additional and quite different, and because this is not known many a man is sorely disappointed to see his coveted promotion snatched away after a brief trial.

The man who seeks a foremanship must prepare to add an additional trade to that which he learned as an apprentice and practiced on the job. The journeyman works with things—tools and materials. The foreman works with men. The journeyman must know how to fit wood and metal and other inanimate materials together. The foreman must know how to fit men to one another and to a common task. His is the work of supervision, organization, and management, and this is a different trade requiring a new apprenticeship. Since there is less and less willingness to permit a man to "experiment on the job," this trade should be learned before the job is sought.\*

The same holds true of the trade of **contractor**, as thousands of men have learned to their sharpest sorrow and at an expense that often ruined the hopes of a lifetime. The contractor does not work with things so much

\* See p. 137

as with costs. His is a problem of management, of book-keeping, estimates, planning, and all the things that belong to the trade of business organization and management. He must know markets, business law, relations of many crafts, and a whole field of information with which the journeyman is not concerned.

He must possess and handle capital, deal with banks and extend credit. The building tradesman who decides to enter upon the field of contracting must realize that he is entering a new trade and courting failure unless he first masters that trade. Fortunately it is possible to gain the necessary knowledge of business management by study while still working at the journeyman's job, and this is the time to learn it. To do so will cost far less than to learn it by worry, guesswork, and costly experience on the job.

## **162. Bidding for jobs**

The contractor in the building trades may prepare estimates and have drawings made, but he usually submits bids upon drawings and specifications prepared by an architect. Several contractors usually submit bids upon the same specifications. It is customary to award the contract to the bidder who offers to do the work at the lowest price in the shortest time, but very frequently a reputation for careful work and scrupulous honesty in fulfilling agreements will offset a somewhat higher bid.

The preparation of a bid on a large structure requires long and careful calculation, involving a thorough knowledge not only of bookkeeping and all the peculiar methods of figuring the use of material in building but also the ability to guess with considerable accuracy at the probable movements of prices in the near future. It calls for a

knowledge of the cost of labor and the probability of labor troubles. The successful contractor needs to know all the customs of the trade in calculating profits and just what is the margin between the point at which he can take a contract with profit to himself and the point at which he will probably be underbid by competitors.

### **163. Financing the job**

Having secured the contract, the contractor must finance the job. This is usually done by credits from material dealers, plus a loan from a bank, or advances from a company, formed to finance the operation of the building, which issues bonds secured by a mortgage upon the completed structure. With large contracts all of these methods and some additional personal ones may be used. A contractor must know modern finance.

He then arranges with the various material dealers for the delivery of bricks, stone, concrete, steel, lumber, and other things needed. He must so plan his purchases and his construction that these things will be delivered just at the building stage when they are needed. This calls for a planning of construction, millwork, and material deliveries more complex than in most factories. If he fails to make his work fit his plan at all points, there is delay. With the tremendous sums involved in erecting many modern structures, this may mean such a penalty as to ruin him.

The actual work of construction must be planned so that each step proceeds in its logical order without delay. He must know what gangs of workmen can work together and the best order for all jobs. He must know when it is best to sub-contract or buy mill and shop work and what can most profitably be done on the job.

#### **164. Dealing with men**

He must know how to organize large bodies of men, apportion responsibility, arouse enthusiasm, secure good work, and keep production at a high standard of quality and quantity. This calls for a wide knowledge of human nature and human relations. He must know how to hire, interest, promote, discipline, and discharge men, how to deal with unions and with individuals, and how to keep production going at the highest possible speed with the least possible friction.\*

Of course the contractor does not usually begin with jobs where all these things must be handled on a large scale. He may begin with small jobs, where he oversees the work himself and where all the problems are comparatively simple. Even here he must assume the risk of a loss as well as a profit, and the question of whether he receives any income for his work depends upon his judgment of the cost of all the things involved rather than upon his skill as a building craftsman.

Fortunately, it is now possible to learn most of these things from the experience of others. There are many books, schools, and courses of study that teach the best methods of handling such problems, and the cost of even the most expensive of these is less than almost every contractor loses upon some job during the course of a few years of business experience.

The minimum requirements for entering the contracting field should include, in addition to the technical knowledge of the building trades, drafting, and mathematics, a course in cost accounting as applied to building, a course in business management, and considerable reading in employment management and safety engineering.

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\* See p. 137.



### 165. Code of ethics for builders

The building trades make an industrial group whose members are closely interdependent. This group has many obligations to the public, the fulfillment of which depends upon the good faith of the people in the building industry. This is a condition that is growing with the complexity of social relations in every industry. It is causing a movement that has been designated as the "professionalization of industry," because it is accomplished by the formation of codes of ethics much like those maintained by the older professions.

The Congress of the Building Industry of the City of New York has adopted a series of regulations and recommendations for its members which it designates "A Code of Ethics for the Building Industry." This sets forth the duties of the various branches of this industry to each other and to the public. Anyone thinking of entering any department of building should make this code a guide to his business relations.

#### ARTICLE I

##### General

It is unethical for anyone engaged in the building industry or any of its branches:

- Sec. 1. To unduly or improperly increase the cost of the work or to produce work or workmanship inferior to that contracted for.
- Sec. 2. To falsely or maliciously injure the reputation or business of another.
- Sec. 3. To offer or accept commissions intended to influence sales or contracts.
- Sec. 4. To endeavor to circumvent the fair and reasonable enforcement of building ordinances and safety and sanitary codes.
- Sec. 5. To resort to or countenance "Shopping."

## ARTICLE II

**The Owner**

- Sec. 1. To endeavor to improperly influence the Architect's or Engineer's decisions as to contract obligations.
- Sec. 2. To call for unnecessary or full estimates on tentative projects, or from unacceptable bidders or to withhold proper facilities from those estimating.
- Sec. 3. To refuse credit data and statement as to reality of the project.
- Sec. 4. To deal directly with the Contractor where an Engineer or Architect has been employed for full services including supervision.

## ARTICLE III

**The Banker**

- Sec. 1. To fail to give due weight to the Community value of improvements for which loans are desired.
- Sec. 2. To fail to acquaint the borrower with all conditions (especially as to approval of materials and construction) under which the loan is made.
- Sec. 3. To overload building costs with fees, commissions or bonuses not legitimately earned.

## ARTICLE IV

**The Real Estate Broker**

- Sec. 1. To misrepresent conditions or conceal any facts having an important bearing upon the real value of a property.
- Sec. 2. To advise a type of development opposed to the Community interest.

## ARTICLE V

**The Architect and Engineer**

- Sec. 1. To act in any other than a judicial capacity in determining contract obligations, or to fail to require full performance equally by Owner and Contractor.
- Sec. 2. To require a Contractor to perform for him any part of the service which is generally recognized as the Architect's work.
- Sec. 3. To cover possible oversights or errors by indefinite clauses in contract or specifications.
- Sec. 4. To withhold certificates for payment when properly due under a contract.
- Sec. 5. To engage in the building trades.

## ARTICLE VI

### **The Contractor**

- Sec. 1. To give, knowingly, work or workmanship inferior to that contracted for.
- Sec. 2. To endeavor to supplant the Architect or Engineer with the Owner.
- Sec. 3. To submit to the Owner directly, without the Architect's approval and knowledge, any proposals or estimates.
- Sec. 4. To fail to recognize his moral obligation to sub-contractors whose bids he has used in making his own proposal.
- Sec. 6. To knowingly or carelessly under-estimate the value or time of completion of any work.
- Sec. 7. To withhold payment to sub-contractors and dealers for work or for materials for which he has received payment.

## ARTICLE VII

### **Sub-Contractors and Material Dealers**

- Sec. 1. To knowingly mislead, through trade customs or terms, as to the real cost or quality of work or materials, and to mislead as to the time of completion of work or delivery of materials at times that cannot be fulfilled.

## ARTICLE VIII

### **Labor**

- Sec. 1. To restrict the quantity or quality of the output of the individual.
- Sec. 2. To increase cost through arbitrary rules as to number of workmen employed or use of plant and equipment.
- Sec. 3. To deny to any man the opportunity to learn, and when qualified, to practice a trade.
- Sec. 4. To abandon the work pending the decision of disputes between trades.

## **Carpenters**

### **166. A declining trade**

In spite of all the changes recent years have brought, carpenters are still the most numerous workmen in building, although the census shows their number to be growing less. The carpenter trade has been transformed at many points. In the great cities, specially, it has been divided into a multitude of trades and scattered through various shops or turned over to recently invented machines. In the country and in the small cities it has changed much less. In such places the carpenter still often designs and builds a house from the foundation to the roof with little help from other trades and little use of millwork except for doors and windows. In the large cities not only doors and windows, but stairs, and much of the other "trim" of a building are made in woodworking shops with the aid of machinery.

Even in the city it is still true that the carpenter who is most successful in his trade knows a wide variety of operations. He may not be called upon to perform such operations except at rare intervals, but, when such an occasion occurs, the man who can do the work is valued highly. As was once said of the need of a gun on the frontier, "You may not need it for a lifetime, but when you do need it you need it mighty bad."

### **167. Qualifications of a carpenter**

A competent journeyman carpenter should be able to stake out a building from its foundations according to specifications, to get out and put up the frame, if made from wood—to erect it from sill to peak. He should know how to weatherboard, shingle, and lath, to build

stairs having straight lines, square and circular turns, to do all simple outside and inside finishing in wood, and to fit and hang ordinary sashes, doors, and blinds.

He must be capable of working from drawings and have some knowledge of concrete form work, and of handling all kinds of carpenter's tools. This means that he should be able to file and set his own saws, to adjust planes, and to know which of the various kinds of bits are best suited for different work. He should know all the functions of the carpenter's large square so that he can calculate angles for braces and rafters. He should know how to keep all of these tools in good order. He must know the characteristics and capacities of many different kinds of wood, for what they are suited, and how to handle them, and how to prepare them for the painter or other workman who is to follow him.

He will require considerable physical strength, as there will be frequent occasions for fairly heavy lifting and many of the operations are fatiguing. As a general rule, however, there are frequent changes in his work so that the strain is not as severe as in other lines. His work is seldom monotonous. It is generally done under healthful conditions. Like that of all the other building trades, it is seasonal, although a skilled workman can often obtain inside finishing work during what are the dull months for those of less ability.

### **168. Carpenter's wage**

The wages, as shown in the table, are usually fairly high, and even with the irregularity, due to seasonal employment, provide an income capable of maintaining a comfortable standard of living. In this, as in every other trade, the demands upon the worker are growing greater

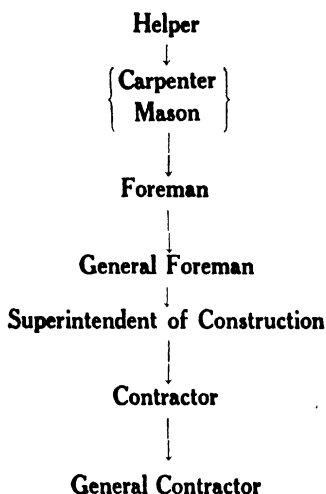
with each year. If the trade is to be entered with the idea that it is a stepping-stone to better things, or with the intention of maintaining a grade that will insure steady employment at the best wages, a common school education is the minimum and a high school education a very desirable preparation. The high school training should, if possible, be one that gives manual training in wood-working and the care of wood-working tools. In many cases, continuation schools are provided for the apprenticeship.

A knowledge of blueprints and of mathematics, especially those used in estimating, is essential. The carpenter should know enough practical geometry to understand the methods by which angles, such as occur in building, are calculated. There should be also a course in freehand and mechanical drawing, and for any important promotion architectural drawing is very necessary. The carpenter should also know the law of business contract, building codes, liens, notes, and discount, statute of limitations, legal regulation of labor conditions, *business English*, bookkeeping, and the kinds, grades, and markets of labor.

He will also find his work much more satisfactory and promotion more rapid if he understands some of the wider relations of his trade, such as deal with the sources and methods of handling lumber, the constant changes in building construction, and all matters dealing with the practices in the trade.

The ordinary journeyman may meet few calls for much of this knowledge in his daily work, but they are the materials out of which he builds the ladder to higher positions. Such knowledge is of vital value at those critical times when the possibility of advance hangs in the balance.

The lines of promotion shown in the following diagram hold for most of the building trades:



In this, as in nearly all fields, there are two important times of choice. One is when the boy decides to enter the carpenter trade; the other is after he has reached the stage of a fairly skilled tradesman. Then he must choose again as to his further progress. If he wishes to fit himself for foremanship, he needs to study the methods of handling men, as already described on pages 137 to 139.

Many carpenters, especially in smaller cities, are able to leap directly to the position of a small contractor. Very many who attempt to make this leap without preparation land in bankruptcy and find themselves back at the trade discouraged.

It should be remembered that in choosing the occupation of either foreman or contractor, a choice of a distinct

though allied occupation is being made. Just as the main concern of the foreman's trade is the handling of men and not of things, so the trade of contractor is that of dealing with costs and not with materials. This is an entirely different trade from that of carpenter, although one that can be learned much more quickly and more easily by a carpenter than by one who has not had experience in the building trades. Before attempting this promotion, which is usually made by one's own efforts, there should be a thorough training in business administration, specially as related to the building trade. The cost of such training is but a fraction of what can be lost in a single false estimate.



## Masons

### 169. History-making craft

This trade is commonly reputed to be among the oldest of human crafts. In some form or another it existed far back of any recorded history, and indeed the structures built by masons form the records from which the history of many times otherwise unknown peoples is written. The trade remained the same through thousands of years until less than a century ago, and more changes have taken place in it in the last twenty-five years than in all the ages gone before. This fact should be taken into consideration in studying the conditions of entrance. It is important to know that changes are apt to take place in the near future.

The greatest transformation has been brought about by the introduction of a number of new materials or new applications of old ones in the building trade. For centuries brick and stone, held together by mortar, were about the only materials with which the mason worked. To these have recently been added concrete in a multitude of forms, stucco of many different kinds, and new applications of iron and steel that have transformed modern building. Much of what has been said regarding the preparation and qualifications needed for entering upon the trade of the carpenter apply to that of the mason. The bricklayer usually draws a somewhat higher wage, and his work is always seasonal, since it is almost impossible to lay bricks in freezing weather.

It has been said that success usually consists in turning obstacles into opportunities, and this long idle season of the masons could easily be turned into an opportunity for education such as exists in few other trades. It is easy

to do this because the wages are definitely calculated to be high enough to provide for living throughout the year upon usually less than six months of work. Entry to the trade is largely by apprenticeships, and the U. S. Department of Labor says of the qualifications of a bricklayer apprentice, "He should be a strong, healthy man, desirous of learning the bricklayer's trade. He should learn how to read drawings and make layouts, and should be willing to attend school continuously for from two to three months a year during the slack season." The same authority states the minimum schooling for entrance into the apprenticeship as "not less than eighth grade."

#### **170. Roads of promotion**

As the principal line of promotion here as in the other building trades is to bricklayer foreman, the qualifications for that position, as set forth by the U. S. Department of Labor, should be studied. They are: "He should be able to read drawings, make layouts for all openings in the building, properly place any stone or ornamental work, and most thoroughly understand the laying of the various kinds of brick bond, lining walls, running-up corners, laying in all wall openings, and setting arches. He must understand the mixing of cement and lime mortars. He should have a general knowledge of other building trades so that he can work in co-operation with the general contractor. He must be qualified to direct the work of men, order all materials, and take full charge of all interior and exterior brickwork on buildings of any size. Schooling—high school; preferably some technical training."

To these qualifications must be added, if the foreman is to be successful, general training in the handling of men. So far as the other branches of the mason's trade are con-

cerned, these are but specialized divisions of the fundamental occupation and usually are not entered without some preliminary training in the ordinary mason's work.

There is one form of education of special value to the mason, and one which he seldom has. This is a knowledge of the history of architecture, of the work of the great masons of the past who built some of the most enduring structures of beauty produced by human hands. He should know what it is about the laying of stone and brick, about the lines of buildings, the form of arches, the proportions of walls, windows, doors, and ornaments to the general dimensions of a building that make it so pleasing that people will travel thousands of miles to see it. The very way in which bricks and stone are laid, the joints between them, the thickness of the mortar, the styles of "bond" used—all these have laws of beauty that have been worked out years ago, and the knowledge of these laws enables any mason to rise at once above his fellow-workers.

## **Structural Iron Worker**

### **171. America's architectural contribution**

America has given one new type of structure to the world based upon the use of steel. It is the skyscraper. This form of building rests upon a method of construction, the central feature of which is a steel skeleton that supports the walls instead of being supported by them. This was the first great advance in building since the middle ages. Not until the Woolworth Tower was finished, did any structure, aside from the Eiffel Tower, which is built upon the same principle, but which served little purpose until wireless was invented, succeed in reaching the height of the pyramids or the cathedrals of the middle ages. The possibility of using these great structures is due to another American invention—the elevator.

This method of building brought into existence a new trade—that of the structural iron worker. These men build the great steel skeletons, reaching sometimes hundreds of feet into the air. Since such work is always on ground of very great value and the capital invested is idle until the buildings are completed, they are always built under high pressure for speed. This haste, combined with the great height and the fact that there is much walking upon narrow strips of steel, has given rise to a high accident rate. This, however, is rapidly being decreased by laws that compel the erection of scaffolds and the laying of floors at regular intervals during construction.

### **172. Young man's job**

Nevertheless this work is still a young man's job. Few men are able to remain at it much past fifty. One phase of it calls for a great deal of traveling. The same

principle that is used in building the frame of the skyscraper had previously been applied in the erection of bridges, and to build these, the structural iron worker must travel all over the world. In time of War it will be remembered that all such men were mobilized to work in the building of steel ships.

There is some reason to believe that this industry has already reached its height. A vocational survey of the city of Minneapolis states concerning this trade: "The beginning age is from 21 to 25, and the age of maximum productivity from 21 to 45. Both employers and employees state that the supply of erectors is adequate. The demand is decreasing on account of the use of reinforced concrete, in which the day laborer has supplanted the erector." There has been little organized preparation for this trade. Those who enter it do so by a system of promotion and apprenticeship, beginning as a **heater**, who heats the rivets and passes them to the workmen. From this the next step is that of **bucker**, who holds a heavy bar of iron with the counter-sink end over the head of the rivet while the **riveter** forms a head on the other end of the hot rivet by an automatic hammer. The **structural iron worker** fits together the steel beams of the framework and fastens them with hot rivets. Many have previously been sailors, steeple-jacks, or other persons accustomed to great heights, and no one should enter the trade to whom height holds any special terror.

### 173. Promotional possibilities

There is little opportunity for advancement except to the position of foreman. There is one field of promotion which is seldom considered in this connection, but which should afford a possible choice to those now engaged in it.

It might well be a start for Civil Engineering in the building of bridges and similar steel structures. It could be made this by an enterprising worker who would make use of the great amount of leisure time which the irregular work with its accompanying high wages affords for the study of engineering branches.

There is another line of promotion directly within the building trades which leads to the position of architectural designer or draftsman. Preparation for this calls for a thorough knowledge of mathematics, including plane geometry, drawing, and architectural drafting and design. To pass from this step to the field of general architecture requires a study of the higher mathematics used for calculating stresses, and all the additional knowledge discussed under the head of Architecture and Civil Engineering.\* The more a person has of these things before entering the trade, or the more that he learns during the early stages, the faster will be his rate of promotion.

\*See pages 73 to 81.

## **Ornamental Iron Workers**

### **174. Early craftsmen in iron**

The great builders of the middle ages used iron for ornaments to an extent seldom thought of in the modern buildings that make steel their structural foundation. The best work of these early artists in iron ranks with that of the foremost sculptors, painters, and architects of the world. The beautiful iron gates, altar railings, doors, and other ornamental ironwork they made are today often preserved in museums and art galleries as great ideals which the present age is not able to equal.

Yet there is a vast amount of ornamental ironwork used in modern buildings. The grille work of banks, stair rails, doors of steel and bronze, vault construction, and many other decorative uses of iron, steel, and other metals show that the field for this art is far greater today than in the time when it reached its highest artistic stage. The Richmond, Virginia, Vocational Education Survey says of this work:

Under the head of ornamental work comes the manufacture and erection of outside and inside stairs, fire escapes, grille work, elevator inclosures, balcony railings, fences, cellar caps, vault lights, and all forms of ornamental work of a like character. In selecting the metal to be used, cold-rolled steel is always chosen for work requiring sharp corners and clear lines, as balcony railings, doors, and grille work, while iron is used for rougher work and on the jobs that do not require sharp edges. Sometimes castings are used, and in some jobs steel, iron, and castings are necessary.

When an order for a piece of work is sent to the factory, detail drawings are made in the drafting room and checked and then sent to the foreman of the ornamental department, who divides the work among the workers. Some men can do one class of work better than another, and the foreman picks these specialists for their line of work.

The **layer out** prepares the work for the other workers. He selects the iron of the proper size and kind, lays out, from the drawing, the proper lengths of stock, marks off all rivet holes, half-lap joints, drill holes, and all other laying out necessary for the information of the helpers and mechanics. After the stock has been selected, cut, and laid off, it goes to the helpers or mechanics in the various parts of the shop. All punching is done on a punching machine, which punches the various-sized holes for riveting, and the operator of this machine is classed as a mechanic. Other holes that cannot be punched are drilled either on the drill press or by portable hand drills, and other work sawed and slotted on the backsaw and the slotter. Castings are ground and filed by helpers. Curved and bent work is sent to the blacksmith who shapes it up according to forms or templates. If many duplicates are to be made, a form is forged or cut to the exact size and shape of the finished product, and all pieces are forged into shape around this form. Pieces of pipe are often needed for railings, and they are bent to shape and the ends threaded by the blacksmith or the helpers.

After all work has been punched, sawed, filed, drilled, and forged, it goes to the **finisher** for assembling. From the detail drawing he is able to place the different parts in their proper places and to fasten them together with screws, bolts, or rivets. When the finisher has properly assembled the job, he passes it on to a helper, who paints it. It is then ready for delivery to the customer or for erection. As a rule most of the men employed as layers out and finishers are foreigners.

This final sentence speaks volumes of the lack of training to meet the demand for the artistic and best-paid side of this trade.

The ordinary entrance to such work is by means of an apprenticeship, often including a knowledge of blacksmithing. The natural line of promotion would be apprenticeship, journeyman, foreman, designer. The qualifications consist of a knowledge of elementary mathematics, geometry, and specially of design.



## **Sheet-Metal Workers**

### **175. Great possibilities of trade**

This trade grew out of the old tinner's trade—putting on gutters and doing a little soldering work wherever required. "Today," says the Indianapolis Vocational Survey, "sheet-metal work is complicated and scientific, and offers the skilled workman as great possibilities as any of the other community's recognized trades."

According to this same authority, the workers in this trade claim jurisdiction over the following work: "All metal roofing; the manufacturing, erection, and finishing of metal cornices, metal skylights, metal furniture, metal lockers, hollow metal doors and trim, metal sash and frames, and metal ceilings and sidings, both exterior and interior; all sheet-metal work in connection with heating and ventilating in furnace work; all work in connection with range work; domes for concrete floor construction; and, in general, the working of all sheet-metal of ten gauge and lighter, coppersmiths having jurisdiction over copper of any and all gauges."

Many machines are coming into this trade and much of the work is done in the shop. A large percentage of it is also repair work. These two facts make for greater stability throughout the year. There are no special occupational hazards aside from those common to the other building trades. The sheet-metal trade has been learned, hitherto, by apprenticeship, the first step being that of laborer who assisted with installation. The second step is to the position of worker in sheet-metal who took partially finished materials and attached them or who made up materials in the shop according to designs furnished him.

A knowledge of geometry and the method of laying out angles for cutting is essential to any real advance in this work. This includes a knowledge of mechanical or architectural drawing and design. There are few trades in which patterns must be cut with so great accuracy in so many different forms. These patterns must be drawn to cut the material on a flat surface but make allowance for bending or fitting in all forms of curves. It is for this reason that the Indianapolis Survey says: "The sheet-metal industry needs the assistance and co-operation of the schools to a greater degree than most of the other metal industries. An elementary course in mechanical drawing for the apprentice, an advanced course in sheet-metal drawing for the apprentices and journeymen who have had elementary mechanical drawing, a course of lectures for all interested, and a course in mathematics as applied to the problems of the sheet-metal worker, would have vocational value for sheet-metal workers." They must also have a wider knowledge of the properties of materials than is required in many other industries. They must know the methods of handling steel, aluminum, copper, tin, brass, and nearly all of their combinations.

As this trade also deals with heat and ventilation, it calls for a knowledge of the principles of air circulation, and the best methods of conserving and distributing heat. It is finding more and more need for training in decoration. Cornices, roofs, and many other portions of the building now added by sheet-metal workers must agree with the general architectural plan of the building. The more the sheet-metal worker knows of the principles of architecture, the greater his chance of promotion.

The person who prepared himself for entering this trade or who adds to his education after entering by a

study of the principles of mathematics, drafting, and design, which a full knowledge of the trade calls for, will for some time to come find himself far in advance of the majority of the workers in the trade and in a position to take advantage of the many opportunities that are always open to the one who stands a little ahead of the crowd with which he moves.

## Painters

### 176. He saves the surface

The painter's work is, in relation to the building, of a two-fold character—preservative and decorative. The slogan of the paint manufacturers of America, "Save the surface and you save all," tells in a sentence the necessity of covering nearly all materials with a renewable outer coat. The painter's trade, like most building trades, has been frequently divided. This division has tended still further to emphasize an old-time characteristic of the trade in that almost anyone can work at it, and yet it calls for the highest skill in some departments. The person who can merely spread paint on rough outside work or slowly daub it over inside surfaces so as to pass muster without too close inspection calls himself a painter, but he is a long way from the highly skilled interior decorator.

The painter must know "the preparation of wood, plaster, and metal surfaces to receive finishing coats, how to remove old finishes, to prepare an almost endless variety of oils and color pigments, how to rub down coats, grain-ing, laying gold leaf, gilding, lettering, free-hand drawing, stenciling, rigging scaffolds, and setting glass."

The lines of progress are usually through specialization in some of these branches. The painter, if an expert in lettering, may become a sign painter, from which he may, if he has some skill at freehand drawing, become a painter of the more or less artistic billboards and other signs that are used in such profusion, or he may specialize in gold leaf work and window sign painting. If he turns toward the more highly skilled phases of house painting and possesses artistic taste in the knowledge of the relation of colors and their suitability for different rooms, with

the fitting combinations of paper, furniture and other decorations, he may become a highly skilled and highly paid interior decorator.

### **177. Automobile finishing**

Another line of specialization leads into the rapidly expanding field of automobile finishing and decorating, which is closely allied to that of passenger car painting and furniture work.

The painter who desires to advance should select the line which seems most suited to his purposes and set about a thorough preparation. He will find most helpful such a knowledge of chemistry as will enable him to know why certain results are produced by the many combinations required for painting. More important yet is a thorough training in the principles of design and color combinations.

Some special hazards of the trade should be realized. Many paints use some derivative of lead, and this is highly poisonous. Careful investigations in recent years have shown that precautions in the way of special cleanliness and care by the painter and of special precautions on the part of the manufacturer greatly reduce this hazard. Other more or less poisonous materials used in painting are turpentine, benzine, naphtha, benzol, wood alcohol, and amyl acetate. For all of these there are special precautions, and the painter who has a thorough knowledge of his materials will always be able to know what step should be taken to protect him from the particular danger at hand.

The opportunities in the trade are good in nearly all sections of the country, but the universal report is that the supply of medium-grade painters is more than adequate, while the supply of high-grade labor is insufficient. Pro-

motion is sometimes in the direction of foreman—more frequently, to that of contractor. Here, as in all the building trades, it should be emphasized that either of these trades is, in its most important essentials, quite different from that of the craft and should not be entered upon without study.

## Paper Hangers

### 178. What he does

The trade of paper hanger is usually combined with that of the painter, except in the larger cities where specialization has gone farther. With the multiplication of all kinds of wall covering, the trade is becoming more and more that of a specialist's. The Indianapolis Vocational Survey gives the qualifications as follows:

The paper hanger's work consists of cutting, trimming, and placing all materials, of whatever kind or quality, applied to walls or ceilings with paste, and all tacking on of muslin, burlaps, or other fabrics used for covering walls or ceilings. Nearly all surfaces to be covered must undergo some sort of preparation. This means, in many cases, the removing of old paper, calcimine, paint, or whitewash. Very often walls or ceilings that have never been covered with anything need to be sized or treated in some manner to aid the paste in holding the paper or covering materials firmly to the surface. Sometimes there are cracks or holes which must be filled with plaster of Paris or some similar materials.

The workman must be skilled in the use of such tools as scissors, trimming board, paste brush, dry brush, and seam roller. He must be familiar with the nature and texture of the material he uses so that he will know what work to do to properly prepare the surface; to mix paste to the consistency which will give the best results; and how to keep the paper from cracking and preserve the color of all materials. Most workmen are deficient in the technical requirements of the trade. As a result, considerable unsatisfactory work is being done. A great deal of good material is spoiled on account of the ignorance of the workmen. Contractors and workmen who are competent to do good work are underbid by men who are incompetent. Such cases seriously handicap those who wish to do first-class work.

The paper hanger should be capable of judging and giving advice on artistic choice and use of wall covering. The line of promotion should be to interior decorating.

## **Plumbers**

### **179. Provides modern home comforts**

Few of us stop to think how much of our modern life is built upon the plumbing trade. Without it most of the comforts and the security against disease, which make great cities as healthful as the open country, would be impossible. Before the introduction of plumbing, such cities were literal pest spots devouring the people who came into them with a death rate scarcely understandable.

The science of bacteriology and of sanitation in general finds its most useful mechanical ally in the plumber's trade. Elaborate methods of sewage disposal make it possible to locate large and healthful populations in places where a generation ago such large numbers of people in one place would have been an invitation to disease. Cities, like London, New York, and Chicago, have built some of the most remarkable engineering structures in the world for the purpose of securing the quantities of pure water that cleanliness and health demand. Plumbing gives to the family in moderate means luxuries that kings and merchant princes could not have bought a century ago.

For all these reasons the trade is a rapidly expanding one and bears all the characteristics that accompany rapid growth. It is filled with people with inadequate training; the demand for skilled workers far exceeds the supply; and only a limited, and therefore highly successful, number of those who work at the trade are acquainted with any large percentage of its possibilities. There are few trades where additional training gives greater promise of immediate returns.



### **180. Plumber's duties**

The duties of a plumber are set forth in the Indianapolis Vocational Survey as follows:

The plumber installs all rough work for bathrooms, toilet rooms, culinary equipment, and all equipment of a plumbing nature which requires interior drainage; puts in all necessary pipes for cold and hot water supply; connects all fixtures; tests for leaks and defects; and leaves the job completely ready for use. This work involves the measuring, cutting, threading, and connecting the different sizes and kinds of pipe; measuring, cutting, and connecting and calking cast-iron sewer and ventilating pipe; cutting and bending lead pipe; wiping lead joints. It is necessary for the plumber to know the names and uses of various elbows, couplings, unions, valves, faucets, traps, and joints. He should be able to distinguish the different kinds and grades of all the materials he uses. He must know the different kinds and makes of the various plumbing fixtures, their particular uses and advantages. He uses a large variety of tools, some of which need special care and adjustment. Unless the plumber is familiar with the different state laws and codes relative to plumbing, he cannot scientifically and satisfactorily perform his work. There are no special physical requirements for plumbers, but they should possess more than ordinary strength, for at times they are required to do heavy lifting.

Any knowledge the plumber possesses or may acquire concerning the technical part of plumbing, such as science of plumbing, mechanical and architectural drawing, mathematics, drainage systems, action of bacteria in sewage, or a general knowledge of modern building construction, will give him a decided advantage.

### **181. Surroundings and wages**

The plumber needs considerable physical strength, good health, something of the mechanical instinct, and a vision based upon the knowledge of the greater possibilities of the profession. Much of the work is done amid disagreeable and even filthy surroundings, and no one should enter the trade who is not willing to undergo these things. The pay is relatively high for the amount of time required to learn the trade, and the work more regular

than in most of the building trades. Insurance companies consider it one of the most healthful occupations and grant a lower accident rate to those who follow it than to the members of any other division of the building trades.

The qualifications are constantly rising, and because of the greater possibilities for evil and the dangers to the general health which ignorance in this field may bring, many cities now grant a license to practice as a plumber only after an examination.

Hitherto the trade has been learned largely by an apprenticeship; the first step being that of a laborer who works where plumbing is being installed, and then becomes an apprentice under a journeyman plumber who is supposed to teach him the trade. After a number of years, generally from three to five, he becomes a journeyman. In a majority of cases the first step of laborer is omitted, and the young man enters directly as an apprentice. The conditions of apprenticeship and the journeyman's duties and payment are, in most cities, fixed quite closely by union rules.

### **182. Training in trade schools**

Many large cities and some of the smaller ones teach plumbing in trade schools, and such an education offers a much more desirable preparation for the trade, although it must usually be followed by at least a short apprenticeship. Because few plumbers have had an opportunity for instruction in the theory and practice of hydraulics and sanitation, the trade has deteriorated in some places, so that the planning is now done largely by sanitary engineers and architects trained in technical schools.

Commenting on this statement, which is taken from

the Minneapolis Survey, the authorities who conducted this survey add:

"If this continues, the trade will take on more and more the nature of semi-skilled labor with a trained technical engineer to plan and direct. On the other hand, the skilled mechanic who understands the practical work and the theory of hydraulics and sanitation is more to be desired than the technical graduate with no skill."

Here is a valuable hint to those who have already entered the trade and are looking for advancement, as well as those preparing for the vocation. Hydraulics and sanitation are sciences that can be taught only from the experience of many fields as set forth in systematic form in educational institutions or books. Fortunately there are plenty of such courses available; and the plumber who will capitalize his trade ability by adding to it the training that can be obtained by study, will promote himself at once to a far more remunerative position.

Another line of promotion leads to that of **master plumber** or contractor; for this there is need for instruction in such subjects as computing contents of tanks and cisterns of various shapes and sizes and the capacity of pipes and boilers; plan reading and estimating of materials; drawing details of valves, traps, sections of bathtubs, sinks, and lavatories; chemistry, including action of hot water, acids, and various materials used in plumbing; electrolysis; septic tanks and disposition of sewage; and plumbers' laws and ordinances.

To such information should be added the sort of training already described for contractor in other lines.

## CHAPTER XII

### **Hotel and Restaurant Keeping**

#### **183. Millions make homes in hotels**

Several million people in the United States at any given moment make their homes in hotels. For a large percentage of these, the hotels are almost the only home they know. There have been few more fundamental changes in social relations brought about by modern industry and the growth of the great city than the disappearance of millions of old-fashioned homes. The rapid extension of the residence hotel and the development of service in many apartment buildings to a point that borders on that given by hotels indicate that we are only at the beginning of this great change.

A little more than a generation ago, the hotel was only a temporary stopping place for persons who were forced to travel. The number of travelers has multiplied many times with the growth of transportation facilities and the increased fluidity of present-day life. At the same time other influences have made the keeping of the individual home more difficult. As a consequence, it is now claimed that the hotel and restaurant industry is the fourth largest in the United States. More than one hundred fifty thousand hotel and restaurant managers are listed by the census, and many of these are the heads of vast establishments larger than many small cities.

#### **184. Grades and divisions of occupations**

The operation of a great modern hotel housing a constantly changing population, sometimes of several thousand people, has become one of the most complex prob-

lems of management. According to a report of a committee of the American Hotel Association on "Vocational Education in the Hotel Business," which is followed quite closely in this discussion, hotel occupations may be roughly grouped into four classes.

1. Managers and assistant managers.
2. Department heads and assistants, such as steward, chief clerk, superintendent of service, housekeeper, chef, head waiter, chief engineer, etc.
3. Skilled workers, such as waiters, waitresses, chambermaids, cooks, storekeepers, clerks, etc.
4. Semi-skilled and unskilled workers, such as houseman, bus boys, bell-men, porters, etc.

The operation of the hotel is further divided according to function into ten different departments: Housekeeping, Front Office, House Service, Cash, Auditing, Comptrolling, Stewardship, Engineering, Kitchen, and Dining Room.

The **housekeeping department** is largely operated by women; and the lines of promotion are from **cleaning girl**, or **chambermaid**, to **ladies' maid**, **parlor matron**, **assistant**, and **head housekeeper**.

The **front office** has either a chief clerk or a manager in charge. The previously mentioned report found that "the average length of time an employe devotes to the hotel business before rising to the position of manager of the front of the house is approximately ten years." Among the more important positions in this line of evolution are **mail**, **key**, **information** and **tube clerks**, and **bookkeeper**, any one of whom may be hired from outside with the ordinary qualifications required for clerical help.

The line of promotion is then to that of **cashier** and **superintendent of mail**, in which latter position there is need for special training. As many as two thousand

pieces of mail sometimes come into a large hotel in a single day. Preparation to meet all the various problems of guarding and distributing the many parcels, telegrams, and letters to the proper persons usually requires about five years of hotel experience.

### **185. Special training needed**

From there to the positions of **room clerk** and **chief clerk** and **manager**, promotion is largely a question of individual ability and experience. Nearly all training at the present time is by word of mouth and actual experience, but there is a general recognition among hotel men that there is need for special training, and steps are already under way to provide this.

The **superintendent of service** has charge of all the employes that deal directly with the patrons, such as bell boys, door-men, checkers, etc. He is responsible for the management of these employes and, to a large extent, for the comfort of the guests.

The **cashier** and **auditing departments** are much like the financial departments of business. There is the same need of specialization in the higher branches of service that is found in any field of accounting.\*

The **stewarding department** deals with the purchase and care of the vast amount of supplies, both of food and hotel fittings. The steward in a big hotel has under him a large staff of employes. Upon his skill as a buyer and his ability to conserve supplies, the success of the entire business largely depends.

The salary of an assistant steward is from \$100 to \$150 a month and meals, while that of steward is from \$150 to \$300 a month with meals, and in some exceptional cases much higher.

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\*See page 121.

A line of promotion with the time required as described by several stewards is given in the report quoted as follows:

1. A few weeks as a dishwasher.
2. A few weeks at every unskilled job in the department.
3. A month in the silver room.
4. A month in the glass pantry.
5. Three months in the salad pantry.
6. Three months as a coffeeman.
7. Six months to one year as a storeroom man.
8. One year as a checker.
9. Three to six months as a receiving clerk.
10. Three to six months as a food controller, if this office exists.
11. If the young man has studied all this time, he should be ready to become an assistant steward. A very ambitious young man should complete this training in three years' time. The time required as assistant steward depends upon the man.

Large hotels also operate a rather extensive **engineering department**, the qualifications and lines of promotion in which, however, are much the same as in the engineering department of any industry.\*

Another important department peculiar to the hotel industry is the **kitchen department**. This is concerned with the preparation of the food, and in large hotels each form of food has its own special cook, all operating under a chef.

### 186. Wages in the kitchen

Wages vary from the pot washer, vegetable cleaners and helpers, who receive from \$40 to \$50 a month, and the bakers, butchers, and minor assistant cooks, who receive from \$70 to \$80 a month and meals, to the skilled

\*See page 124.

special cooks with salaries of from \$100 to \$150 a month and meals. All of these lead to the position of chef, who ordinarily receives \$150 to \$200 a month and meals, and may in exceptional cases receive much more.

The order of promotion and time required is given as follows:

Vegetable Cleaner and Potato Peeler . . .	three months
Pot Washer . . .	three months
Fireman. (if any) . . .	three months
Assistant to Baker . . .	three months
Assistant to Butcher . . .	three months
Assistant to Garde Manger . . .	three months
Assistant to Fry Cook . . .	three months
Assistant to Roast Cook . . .	three months
Assistant to Second Cook . . .	three months
Regular Fry Cook . . .	six months
Regular Roast Cook . . .	six months
Regular Second Cook . . .	six months
Chef . . .	six months

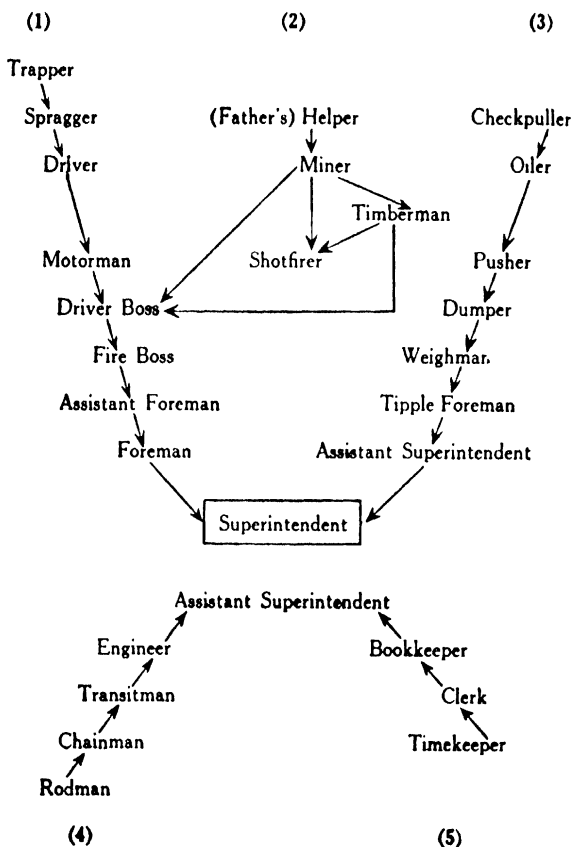
Note: For a young ambitious man, the time of apprenticeship might be reduced to a minimum of three years. Experience in different hotels is necessary.

The **dining room department**, which consists of the head waiter and a staff of waiters, cashier, and bus boys, has charge of the serving of the meals.

The line of promotion and salaries is much the same there as in the kitchen, except that the wages paid for the higher jobs are somewhat lower.



## Lines of Promotion in Coal Mining\*



1. Inside labor route.  
4. Engineering route.

2. Miner's route.  
5. Accounting route.

3. Outside labor route.

\*From Bulletin of Federal Board for Vocational Education

## CHAPTER XIII

### Mining

#### 187. In every state but one

Although mining is seldom chosen by people who have before them a choice of several other occupations, it is one which now gives work to more than a million men in the United States. It is followed to some extent in every state of the union except in Mississippi. Three-fourths of these workers are coal miners. Not over twenty-five per cent of them have a common-school education. This lack of education and training is, to some extent, responsible for the fact that one person out of every four who enters the trade is injured by accident during his life, and that one out of every ten, if he remains at the trade through an ordinary lifetime, may expect to die in a mine accident. This is a fatality rate much higher than that of any army engaged in the World War. That there is some connection between ignorance and accidents is shown by the fact that seventy-one per cent of the fatal accidents in Pennsylvania and ninety per cent of all accidents in Oklahoma occur among foreign born, mostly non-English-speaking employees.

There are a large number of positions in the mine where special training is required, generally by law. This is true for mining inspectors, foremen, fire bosses, and, in a few states, for shot firers and hoisting engineers. Indeed, "some States require that a man must have had a certain amount of experience gained by working with a practical miner, and pass an examination on practical mining subjects such as the detection of gases, timbering,

and explosives before being granted a certificate of competency as a miner. He should be able to read, write, speak, and understand English."\*

### 188. Not enough trained men

At the present time there are not sufficient men trained to take these higher positions, and, as a consequence, nearly every coal mining state has found it necessary to issue temporary permits, or to relax the examination below the fixed legal requirements. Where this is done, the persons holding the positions are usually required to take special training. It is doubtful if there is any other industry that can parallel this situation, where legal standards of education were established in advance of the possibility of obtaining a supply of persons to meet those qualifications. This means that there is certain opportunity of promotion to those miners who are willing to study. Few occupations offer a greater amount of regular leisure time for study. Most coal miners work less than two hundred days per year, and nearly all of them work but an eight-hour day.

The young man in a mining community who has the ambition to study is certain of quick promotion to one of the jobs just listed. While in some instances the salaries paid for the first step upward from the common miner are not much higher than the wage received by the man who works with a pick or at a machine, yet the accident risk is greatly lowered and the opportunity for further promotion greatly increased.

The outline, page 242, made up from a table prepared by R. Z. Virgin, a well-known mining man with over thirty years of experience, illustrates the routes to the position of superintendent of a colliery.

\* Federal Board for Vocational Education, Bulletin No. 38, p. 31.

While these routes suggest the courses a young man may follow, yet an older person might enter at several points, say as trapper, spragger, driver, helper, oiler, pusher, or dumper.

Routes 1, 2, and 3 assume nothing more than a common-school education; route 4, a high-school training, or a technical graduate might enter as a transitman or engineer if he has some previous mining experience; route 5 requires a high-school commercial course or business-college training.

It must not be understood that this outline includes all the possible routes, nor the variations that can occur in the routes given. It is introduced here as being suggestive of the roads to promotion.

For metal mining the lines of promotion are given as follows:

#### Lines of Promotion in Metal Mining

Underground Superintendent	Mill Superintendent
Foreman	Foreman
Shift Boss	Assistant Foreman
Timberman	Flotation Man
Machine Driller	Table Man
Mucker	Jig Man
Trammer	Crusher Man
Cager	General Laborer or Helper
Nipper	

Nearly every mining community is now developing special educational opportunities, and these are also made available by correspondence for any section in the United States. Above all these lines of promotion, there are the further steps of geologist and mining engineer. These usually demand a college education.

## CHAPTER XIV

### Forestry

#### 189. Roosevelt's work

America, once the land of most abundant forests, awoke less than a generation ago to the fact that its resources in that line were falling behind those of many nations far less richly endowed by nature. Largely due to the impulse of Theodore Roosevelt, who was then president of the United States, this nation entered on a campaign of conservation, one phase of which was the care of its remaining timber areas and their replacement in depleted sections. This gave rise to the occupation of forestry.

Forestry is an old occupation in Europe, and many of the best trained foresters still come from there. Forestry is concerned with the continuous cropping of land raising trees. This includes the care of existing forests and the planting of new ones.

Forests have many uses besides the production of timber. They control the stream flow and as such are of value in irrigation, and the forester must know something of drainage problems. The greatest enemy of the forest is fire, and the planning of systems of fire protection and guarding against outbreaks of fire are the principal duties of the forester. He must know the enemies of the trees—the insects and fungous diseases. He must know how young trees are raised and cared for, and he must be able to put all his knowledge together in a plan for getting the most out of the forests while preserving their productive power.

### 190. Education needed

In most American forests he will have considerable responsibility in the oversight of grazing rights. He will need to know how to lay out roads and how to conduct lumbering operations. Forestry is an outdoor job. It calls for health and vigor. It also calls for a great deal of education. The Federal Board for Vocational Education, after pointing out that there are more than twenty schools that offer courses in forestry, many of them a full four years of university training, says:

As a basis for the more technical phases of his education, the man who desires to become a professional forester must have had courses of collegiate grade in botany, geology, organic chemistry, mathematics through trigonometry, plane surveying, mechanical drawing, economics, and either French or German, or preferably both. With these as a foundation he is ready to go ahead with the technical subjects such as dendrology, silvics, silviculture, forest mensuration, forest valuation, forest management, and forest regulation.

There are three distinct lines of forest work. The lowest position is that of a **forest guard** who is usually an assistant to the **forest ranger**. The guard has need of little preparatory training further than a practical knowledge of lumbering and, if possible, some little experience as an assistant in surveying. The next step is to that of **forest ranger**, who is a semi-technical assistant to the professional **forester**. He will have charge of the routine of fire protection and fire fighting, marking trees to be cut, scaling logs, handling planting operations, surveying, building trails, and running telephone lines. If he is to rise to the position of professional forester, he must make use of his leisure time to master the subjects already described.

The salaries in the national forests for guards are about

\$900 a year; for forest rangers, \$1,100. Usually shelter is offered and often opportunity is given to raise gardens. A professional forester gets from \$2,500 to \$3,500 a year with similar privileges. In some cases private foresters who have charge of operations for a big company receive from \$4,000 to \$5,000 a year.





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## CHAPTER XV

### Civil Service

#### 191. Working for Uncle Sam

The United States is the largest employer in the world. A majority of those employed by the Federal Government are under what is known as the classified Civil Service. There are about 400,000 so employed, and 40,000 annual vacancies. Over 200,000 persons take the examination for these vacancies. From this number about 60 per cent pass and 40 per cent of those who pass are appointed. These figures are, of course, only approximate and vary greatly from year to year.

There is almost no occupation that is not included in the Civil Service. A report of a Congressional joint commission in 1920 classified the services under the three following heads: 1. Services involving clerical, office, or commercial work under which there are fourteen sub-heads; 2. Services involving skilled trades, manual labor, public safety, or railroad work with eleven sub-classes; 3. Services involving technical, professional, or subsidiary work with nineteen sub-divisions. Each of these forty-four sub-divisions is again sub-divided into its own classifications, totaling nearly eighteen hundred occupations. Of course, in some of these occupations, only two or three, or even but one person is employed, but anyone desiring to choose the Civil Service can usually find almost any desired occupation in which there is possibility of securing a position.

Entrance to the classified Civil Service is by examination, and certain conditions are set up as qualifications for even taking this examination. These include citizen-

ship, certain age limits, and physical health. Often there are other special qualifications besides these for the examination. The examinations themselves are prepared to test the ability of the applicant to perform the job sought for. As a usual thing, it is possible to obtain copies of questions that have been used in previous examinations, and in most cases the announcement of the examination itself describes the subjects to be covered. The salaries to be paid are always stated.

There are many schools that train for Civil Service examinations, but the person who will write to the United States Civil Service Commission at Washington, or who will visit the nearest Post Office or Custom House can obtain information of great value to him in preparing for the examination.

## **192. Promotion slow**

As a usual thing, promotion in the Civil Service is slow. There is sometimes a steady increase in salary according to the number of years served, but this is by no means a universal rule. It is usually necessary to take an examination for a higher position and to meet open competition in so doing. It is generally stated that the wages for the lower positions are somewhat higher than for corresponding work outside; for the higher positions the reverse is true. As a consequence, a large number of Civil Service employes leave Government work annually to take up higher-paid positions in private industry. This is especially true of scientists and experts in such departments as the Patent Office.

There are many privileges that go with Civil Service employment. In Washington clerical employes are usually not employed more than seven or seven and one-

half hours a day with a half holiday on Saturday. The eight-hour day is established by law for all Federal employes; in some departments of the Post Office, however, this law has not been enforced in recent years. Most Civil Service employes are entitled to thirty days of vacation yearly and to a certain amount of sick leave with pay. The position is usually permanent. Government employment is not subject to most of the fluctuations that affect private industry. There are some special restrictions on Government service. The sort of outside work that may be done is sometimes limited by law; for instance, no employe in the Executive Civil Service may indulge in any political activity or publicly express his opinions on political subjects. Neither may he be concerned in any manner in the instruction of any person who is preparing for a Civil Service examination. Various other departments have special restrictions designed to guard against undesirable relations with outside industries. There is almost universal complaint that Civil Service restricts individual initiative. There is a mass of "red-tape" and a mechanical routine which is repulsive to many persons.

Nearly everything that has been said about the Federal Civil Service applies to the almost equally large field of State and Municipal Civil Service. In many localities, however, the Civil Service Laws are not strictly enforced, and, as a consequence, political influence interferes with obtaining positions or promotions after work has been secured.

As a general thing it may be said that Civil Service offers a desirable choice for those who prefer security to adventure, who have little self-assertion, are willing to take orders, and are not irritated by detailed rules and

regulations. Civil Service offers a shelter to those to whom competition is repulsive. It also offers an opportunity for study. Those who are attracted by Civil Service and who have as a hobby some particular line of investigation or research can often make of Civil Service a means of support while finding much of their enjoyment outside. This is done more frequently in Europe than in this country. A number of important contributions to literature and science have been made by British Civil Service employes in lines wholly outside their regular work. Since Washington is one of the educational centers of the world with splendid libraries and other opportunities for research, this is a phase of Civil Service employment not to be overlooked.

## CHAPTER XVI

### Social Service

#### 193. Organizing human relations

The disappearance of neighborhood relations and of the personal touch and sympathy existing in old established communities and the substitution of constantly changing relations in great industrial centers have left society with a pressing need for some sort of organized humanizing influence. The problems of modern poverty cannot be met by simple personal generosity between friends. Those who give and those in need are far separated geographically and socially. A similar separation in industry, in the church, and in political and governmental relations has brought a long train of evils.

To meet this need, to organize and give expression to that feeling for social service which is one of the deepest of human instincts, there has grown up a whole new series of occupations employing tens of thousands of men and women.

**Organized charity** was perhaps the first of these fields to reach a high degree of specialization. In any large city there are hundreds and sometimes thousands of agencies for relief in addition to many times as many individuals who are willing to endeavor to relieve poverty if they can be sure that their efforts are well directed. The organized charity worker acts as an intermediary for all these organizations and individuals on the one hand and for the great mass of needy on the other. He or she (as yet the majority are probably women) receives applicants for relief, investigates them, diagnoses the need, prescribes the

methods of relief and treatment required, and seeks to obtain this prescribed treatment from the proper sources.

The **social settlements**, which had a great growth in the early nineties of the last century, furnish another field of opportunity. Much of their work is done by volunteers, but nearly every settlement has several paid workers.

At every point social service work laps over and is often closely associated with churches, with schools, and with certain phases of politics. The Y. M. C. A. and Y. W. C. A., Knights of Columbus, and similar organizations employ workers of this kind. The large number of reform organizations dealing with prison improvement and all phases of vice and poverty are continually calling for trained workers. Perhaps the largest field of all is just opening in connection with industry under the name of **welfare work**, a name which is sometimes resented as indicating a paternalism which should be avoided if the work is to be successful. Many industrial plants are organizing a wide field of activities and are calling for trained workers.

#### 194. Growth of training

In the beginning there was never any thought of training people for such work. It soon became evident, however, that skill, even to be kind, does not come without training. To do good on a large scale in the complex conditions of modern society requires something more than good intentions. Consequently, a number of schools have already been established to give training in social service. Some of the leading universities now have departments, or at least one or more courses, that prepare students for this work.

The person who is to enter this work must have a strong desire to serve. To this must be added efficiency in serving. One of the forms of knowledge required in nearly every one of these fields is what is known in organized charity as "case work" and which in the industrial field is closely allied to job analysis. This is the ability to individualize each problem and to analyze all its phases. This calls for a knowledge of a rather elaborate technique involving the preparation of forms, questionnaires, and methods of securing the information needed.

There is also need for leadership and organizing ability. Before the worker in this field can progress very far, he will be called upon to form societies and organize resources upon the one hand and methods of administration upon the other. One phase of the work upon which success often depends is the ability to organize financial campaigns and systems of solicitation to maintain social service work. For this a knowledge of some phases of salesmanship and advertising is valuable.

A very important form of such work is carried on in institutions such as hospitals, insane asylums, orphanages, and homes of many kinds. Here a specialized form of business training is helpful. Many times there is need of much technical knowledge of the social, industrial, medical, political and educational conditions that must be met.

Salaries in the beginning, at least, are seldom high and even the best paid positions do not offer the rewards that may be expected in other professions. A minimum of \$20 to \$30 a week for a beginner and a maximum of \$5,000 and \$10,000 a year for the highest paid administrative positions loosely define the limits of compensation.



The person who intends to enter this work should begin as a volunteer. It is always easy to make connections with organizations having need of such workers. This not only gives the preliminary training during spare time but it tests the abilities and inclinations of the person for this sort of work.

## CHAPTER XVII

### Agriculture

#### 195. Importance of occupation

More people are engaged in agriculture than in any other occupation. It is one of the oldest of industries and is, in some ways, the foundation of all other industries. It is the great "extractive" industry, taking from the earth the raw materials upon which a host of other industries work, and the food that sustains the workers in those industries.

Its advantages are many and have been celebrated by writers from the most ancient times. The farmer who owns his farm is sure of a job. He has no immediate superior from whom he must take orders. His reward depends directly upon his own exertions. He can almost always "make a living," because he can raise his food. His work is largely in the open air, and his expectation of life is longer than in most occupations. He is not separated from his family by his work. He has the satisfaction of seeing the immediate results of his efforts, of watching the growing crops, thriving stock, and increasing returns from his labor. His savings are automatically invested in his farm and his equipment and, in most sections, rising land values give him a rather high rate of interest upon this investment.

In the older settled neighborhoods the farm is no longer isolated from the rest of the community. Telephones, rural free delivery, and the automobile, of which farmers own more than any other class of workers, bring

them in close connection with wide circles of the surrounding country. The farm house can be equipped with all the conveniences and facilities available to the city dweller, and the farm owner at least is not worried by rising rents.

### 196. Other side of picture

This is a side of the picture often painted, and it is a true side for millions of farmers. That there is another side equally true for an almost equally large number is proved by the fact that all the eloquent preaching about the beauties of farm life was not able to keep two million of the farm population from flocking to the cities in the decade from 1910 to 1920. It is also proved by the constantly increasing proportion of farm tenants in all parts of the United States and specially in just those parts where land values are highest, land is most fertile, markets most available, and farm incomes highest.

If the farmer has no immediate "boss" at his elbow, he has a great impersonal boss in the demand for his product which decides what he shall receive and sometimes makes his income less than the wages of other workers. Although the general movement of land values is upward, in times of falling prices for all products many farms will also decrease in value, and the farmer finds that his investment is slowly fading away.

The changing character of farming is changing the conditions of success in the industry. If machinery makes the work of the farmer less exhausting upon his muscles, it demands a higher training of his mind and exacts a greater investment of capital. Modern specialized agriculture divides the industry into dairy, poultry, fruit, truck gardening, and several other main branches, and these again, in some sections, are subdivided by still further

specialization. To succeed in these lines requires just as thorough training as in similar highly specialized trades in other lines.

### 197. More education needed

In fact agriculture is following a general line of development common to most industries in that it is constantly calling for more and more thorough preparation. Today, no one should think of becoming a farmer without some preliminary training. Even the boys who are born upon farms and have been accustomed to every agricultural operation from childhood are coming to realize that such experience is by no means sufficient to make them efficient and profitable farmers.

All recent changes in agriculture have been of a kind to increase the need not only of more education, but of greater capital. The equipment of a modern farm, with tractors, mowers, binders, trucks, and the long list of farm machinery, is as expensive as that of a good-sized factory and requires many of the same abilities successfully to operate it. Recent investigation by many authorities on farming in the United States and by the Canadian commission for settling returned soldiers upon farms has reached a common agreement that the minimum capital required for a successful start in farming is between \$3000 and \$5000, depending upon the place where the start is to be made.

The great mass of farmers enter the occupation because they are born into it. The sons of farmers have every opportunity to measure its possibilities by experience. Having entered it, the great majority remain in the semi-skilled classes or, under the constantly sharpened

competition of modern farming, fall into the class of failures who are driven off the farm by their inability to make a living. Those who make the extra effort here, as everywhere else, lift themselves into the really desirable positions.

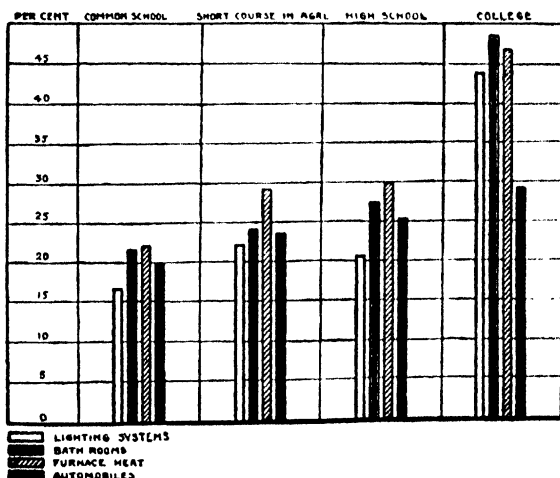
### **198. No lines of promotion**

There are no direct organized lines of promotion in agriculture, but there are certain positions that may be used as stepping-stones. One of the commonly accepted lines is from **farm laborer** to **renter** to **owner**. This line is becoming harder to follow each year. The step from renter to owner is the hard one, and the percentage of failures is high.

Those who do succeed must have just that additional preparation and determination which is essential to success in every field. If you are to start on this line of promotion, you should fit yourself for the higher positions. The man or boy who has studied in an agricultural high school, taken a "short course" at some university, attended farmers' institutes, asked for and studied the bulletins issued by his State Agricultural Department and the United States Department of Agriculture, or, if possible, taken a full course in agriculture at some university, will find that months spent in such work are saved in years needed to raise himself to the position of a farm owner. He will receive higher wages as a farm laborer, accumulate the capital needed to become a successful tenant sooner, earn the money needed to buy a farm in fewer years, and be far more certain of prosperity and independence in his career as a farm owner.

A vivid picture of how education pays in this, as it does in every other field is shown by the following diagram showing the comforts found on certain Wisconsin farms, classified according to the education of the owner.

## EDUCATION AND FARM IMPROVEMENT (825 WISCONSIN FARMS)



Education and farm improvement, based on a study made by the College of Agriculture, University of Wisconsin

### 199. "Back to the farm"

Many men who have reached middle age in some city work wish to change to farming for the remainder of their lives. There are usually plenty of real estate agents who are willing to encourage this wish in order to sell farms. There is no insuperable obstacle in the road of such a

choice. Thousands of men have made it successfully, just as thousands more have attempted it and failed.

There are certain preparatory actions that make the chance of success much greater. Farming is a highly skilled trade which must be learned before success can be hoped for. It cannot well be learned entirely from books, but books can save much time and money in the process of learning by experience. Before the city worker decides to move "back to the farm," he should make sure of a number of things. Will his wife enjoy the change and help in the work? This does not mean that she will need to work in the fields, except in a few instances. But she must co-operate enthusiastically in a host of ways. The Wisconsin commission having charge of the placing of new settlers in that state makes this one of the first considerations in judging the fitness of prospective farmers. On the farm the family is a firm, and discord in the management is fatal to success.

Are you sure that you like farming? Do you have a garden where you now live? If there is no room, did you take advantage of the "War Garden" movement, and, if so, did you really enjoy the work, and were you successful? It is very often desirable to take an intermediate step of moving to a suburb and testing your skill and interest while retaining your present job.

### **200. What can you do best?**

Just what kind of farming do you wish to enter? There are many kinds. For "truck farming" or vegetable gardening, a small acreage near a big city will give an opportunity for a trial with less risk. Poultry farming attracts many who fail to succeed amid, it is true, many striking successes. If attracted by this branch, there is ample literature that should be studied before risking your

livelihood on a large scale. Moreover, this is a line of work in which the whole problem changes with size. Handling a poultry farm large enough to support a family is a business very different from keeping a few chickens on a city lot, even though the latter is a good beginning toward preparation for the former.

Dairy farming requires an investment of several thousand dollars. If this must be obtained largely by borrowing, there are many questions of business judgment in deciding, while the opportunities for mistakes are many.

Bee keeping is attractive to many. It is something very different from watching a few hives of bees and gathering honey for the table. It calls for experience and training in many lines. The occupation is pleasant and often profitable, but only for those who have prepared themselves by experience and study.

### **201. Knowledge for the asking**

There is little excuse for ignorant action in the field of agriculture. An endless amount of information is available for the asking. The Federal Department of Agriculture will supply bulletins and information upon any subject connected with farming. Anyone considering entering any phase of this occupation should avail themselves freely and extensively of this source of information. When you have decided upon the locality in which you wish to secure a farm, ask the United States Geological Survey for a soil map of the locality. This will usually cost a few cents and will give much more detailed and far more accurate information than a prospective seller of the land is apt to give.

Almost every state in the union has an agricultural department. A letter addressed to such a department at



the state capital will usually bring valuable information in selecting a farm with instructions as to where further unbiased information may be obtained. Many states maintain a system of "County Agricultural Agents." These are experts whose business it is to give free advice and help to the farmers in the locality. There is a great advantage in locating where the help of such an agent is available.

For those already on a farm there are some lines of advance that are frequently overlooked. One of these is from the position of farm laborer to that of farm manager. The young man who has learned the technique of farming by experience and the principles of agriculture by study can fit himself for the position of manager of one of the many large farms, now steadily growing in number and importance, by a study of accounting and business management as applied to farming.

Concerning the opportunities for employment as farm managers, the Federal Board for Vocational Education says:

Only 60,000 farms out of 6,361,000 employed managers and superintendents, according to the 1910 census. But it is practically certain that more than one farm in a hundred would have been operated by managers had there been a larger number of effectively trained men available to men owning or in position to own, farms large enough to justify the employment of a manager. The Department of Agriculture and the state agricultural colleges report inability to fill numerous calls for farm managers and superintendents, and the advertisements in the agricultural and live-stock papers for them indicate that the demand continues.

The same authority continues on the subject of salaries:

Commonly farm managers and superintendents are receiving annually from \$1,000 to \$3,000, and on large estates often

\$4,000 or \$5,000, with many perquisites, such as dwelling, garden and truck land, fuel, and the privilege of keeping a cow, pigs, and poultry.

The rapidly multiplying and growing departments of agricultural work in government departments with their increasing lines of service are offering many new openings for persons trained in agriculture. The work is pleasant, fairly well paid, and offers splendid opportunity for further study. Many thousands of experts are now employed by agricultural colleges and national and state departments. Inquiry of these departments, of civil service boards, and agricultural colleges will supply a list of such positions, present and prospective vacancies, salaries paid, qualifications demanded, and methods of securing the positions.

Such positions should certainly receive first consideration by those who have already learned the technique of farming by experience.

### **Farm Mechanics**

#### **202. Coming of farm machinery**

Farming was one of the last industries to feel the effects of the mechanical revolution. Machinery came to the American farm on a large scale at the time of the Civil War, but it was not power-driven machinery such as was used in the factories.

Long after steam and electricity had driven muscle as the main motive force from other lines of industry, the strength of man and beast was the main source of power upon the farm. Indeed it still remains the largest source of power as is shown by the accompanying diagram.

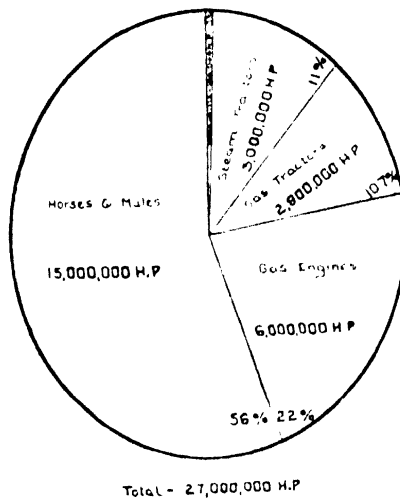
Only within very recent years has the principal machinery used in agriculture been driven by some form of inanimate energy. The change is in full swing and is one of the greatest industrial changes now taking place in the world. A transformation is taking place upon the farm comparable only to that which took place in transportation and manufacturing during the last century.

With the coming of the tractor and the general application of gas and electric power to all forms of farm machinery, a new form of skill is called for in agriculture. Power-driven machinery is more complicated than horse-driven. It requires more skillful mechanics to run it and keep it in order; yet it will be a mistake to think that the factory-trained machinist can become a successful farm mechanic simply by walking beyond the city limits. He must know farming as well as mechanics.

Farm machines are of many kinds. Their operation depends upon the season. Often one kind will be run but a few days during an entire year. A man who knows only this one operation would be of very little value on a farm. The farm is usually far from a repair shop, and

the farm mechanic must know how to make repairs on the spot. He is greatly helped in this by the fact that

## POWER ON AMERICAN FARMS



Used on Farms

27,000,000 H.P.

Used in Manufacturing Establishments

22,500,000 H.P.

Source: U.S.

From Bulletin of Federal Board for Vocational Education

practically all farm machinery uses interchangeable parts. He must know how to care for the machinery and how to get the maximum of product from it.

He must also know what is far more important—the relation of that machinery to its purpose. His product is not something that fits a gage or conforms to a blueprint. He must know the principles of soil cultivation, crop care, methods of harvesting and storage. It is not enough to know how to run a mower or binder, a hay tedder, rake, or loader. He must know when and how crops should be planted, cultivated, and harvested with least waste.

There is no doubt but what there will be a large demand for the sort of farm labor that can efficiently use modern farm machinery. At the present time there is a universal complaint among farmers that the people who go out from the cities are almost hopelessly ignorant of the trade of farming at which they wish to get a job.

Preparation for the work of a farm mechanic calls for the practical knowledge of machinery already mentioned, which can usually be obtained in short courses in agricultural colleges or in plants manufacturing such machines. Since it also calls for a knowledge of farming, it offers an opening for farm boys who have learned the trade of farming by experience, and offers them an opportunity to exercise their mechanical ingenuity without loss of their personal capital in farm knowledge.

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